



**Southern Wood Piedmont Company**

**RCRA PART B  
POST-CLOSURE PERMIT RENEWAL APPLICATION  
FOR  
SWP - CHATTANOOGA, TENNESSEE SITE**

**VOLUME II – APPENDICES**

**May 2001**

**PLAN FOR ELIMINATION OF STORMWATER  
RETENTION PONDS 1A/1B, 2A/2B, AND 3B**

**CHATTANOOGA, TENNESSEE**

**Prepared For**

**SOUTHERN WOOD PIEDMONT COMPANY**

**June 16, 1999**

PLAN FOR ELIMINATION OF STORMWATER  
RETENTION PONDS 1A/1B, 2A/2B, AND 3B

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ATTACHMENT      Stormwater Laboratory Reports

DRAWINGS

CL-101	Existing Site Drainage Map
CL-102	Proposed Site Drainage Map
CL-103	Stormwater Retention/Treatment Ponds 1A & 1B Grading Plan
CL-104	Stormwater Retention/Treatment Ponds 2A & 2B Grading Plan
CL-105	Stormwater Retention/Treatment Pond 3B Grading Plan
CL-106	Stormwater Pipe Plan & Profile
CL-107	Cross Sections
CL-108	Headwall Sections and Details
CL-109	Stormwater Drainage Ditch Sections and Details

## **PLAN FOR ELIMINATION OF STORMWATER RETENTION PONDS 1A/1B, 2A/2B AND 3B**

### **1.0 INTRODUCTION**

This plan describes activities scheduled to remove five stormwater retention/treatment ponds from service at Southern Wood Piedmont Company's (SWP's) former wood treating plant site in Chattanooga, Tennessee. These retention/treatment ponds, designated 1A/1B, 2A/2B and 3B, were installed to abate the discharge of stormwater runoff potentially contaminated with creosote constituents during operation of the former wood treatment plant between 1977 and 1988. The ponds were operated and discharge was monitored in accordance with National Pollutant Discharge Elimination System (NPDES) permit No. TN0028380.

Pond 1A collected stormwater from an approximately 21.6-acre portion of the production area of the former treating plant and an adjacent treated wood storage area as shown on Drawing CL-101. The pond was designed to collect runoff from the first 3/4 inches of rainfall. Runoff was diverted to overflow spillways after collection of the first 3/4 inches of rainfall runoff. Stormwater collected in Pond 1A was transferred to Pond 1B by both gravity drainage and pumping where the collected stormwater was aerated to enhance biodegradation of creosote constituents. Water samples were obtained within Pond 1B to determine compliance with NPDES permit limits prior to discharge to Chattanooga Creek via the adjacent floodplain. Samples were also obtained as the treated stormwater was discharged and the laboratory results reported to Tennessee Department of Health and Environment [now Tennessee Department of Environment and Conservation (TDEC)] pursuant to the NPDES permit requirements.

Pond 2A collected stormwater from an approximately 5.2-acre treated wood storage area at the east end of the former treating plant (Drawing CL-101). Ponds 2A and 2B were operated similarly to Ponds 1A/1B to collect and treat stormwater runoff from the first 3/4 inches of rainfall and to discharge the treated stormwater in accordance with the NPDES permit.

Pond 3A, which was used to pretreat process wastewater prior to discharge to the Chattanooga Publicly Owned Treatment Works (POTW), was closed under a permit issued by TDHE in 1987. Creosote containing waste was removed from the bottom of Pond 3A after dewatering. The pond was then filled with clayey soil obtained from the northern portion of the site where no wood treating

activities or treated product storage had historically occurred. Pond 3B which collected stormwater runoff from the former track area was drained by pumping and visually contaminated sediment was removed at the time Pond 3A was closed. Pond 3B remains in service and collects rainwater runoff from a portion of the former drip track area and from the closed Pond 3A cover (approximately 14.8-acre drainage area as shown on Drawing CL-101). Stormwater collected in Pond 3B is currently pumped to the POTW as required to prevent overflow of the pond.

The wood treating plant at the Chattanooga, Tennessee site was closed in 1988. All plant structures and trackage except the wastewater pretreatment plant, 150,000-gallon wastewater storage tank, and the shop building were demolished and removed from the site. Visually contaminated soils were removed from the surface and from areas excavated during plant demolition. These excavated areas and areas of former plant foundations and slabs were covered with soil from the northern portion of the site and grassed. The primary areas where excavation of visually contaminated soil occurred are located along the former drip track, along a short spur line running beside the western property line, and within the CERCLA reported pond south of the former treatment plant (see Drawing CL-101). The CERCLA reported pond was filled with clayey soil obtained from the northern portion of the site, graded to convey runoff to the Chattanooga Creek floodplain, and the surface grassed for erosion control.

The following site activities have removed sources of contamination of surface runoff with creosote constituents:

- demolition of the treating plant
- removal of visually contaminated soil from the bottom of ponds 3A & 3B the bottom of the CERCLA reported pond, and from the ground surface along the drip track
- placement of clean fill and grass cover in excavated areas and over the former plant foundation slabs
- maintenance of a grass cover.

Therefore, stormwater retention and treatment is no longer necessary to abate the discharge of stormwater contaminated with creosote constituents at the Chattanooga site. This absence of need for stormwater retention and treatment has been demonstrated by collection and testing of stormwater runoff during six rainfall events between March 1992 and December 1996. Analyses of these samples has shown that the stormwater runoff contains none of the listing constituents for hazardous

waste code F034 (wastewaters that have come in contact with process contaminants, process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations) per 40 CFR 261.31. Copies of the laboratory reports for these site rainfall events are included in Attachment 1.

## **2.0 PERFORMANCE STANDARD**

This plan is designed to maintain the present stormwater run-off control and monitoring (if required) in accordance with TDEC General Stormwater NPDES permit requirements, without the collection and batch treatment provisions of previous NPDES permits. To accomplish this, the ponds will be filled with native clayey soil and the surfaces graded to drain and grassed for erosion control (see Drawing CL-102).

## **3.0 PLANNED ACTIVITIES**

Activities to be performed to eliminate each of the five ponds will be similar. These activities are as follows:

- 1) Remove vegetation and standing water - Areas marked for excavation will be cleared and grubbed. Stormwater and infiltrating ground water (the bottoms of ponds 1A and 3B are below seasonal high ground-water level) will be pumped to the Chattanooga POTW in accordance with an existing discharge permit.
- 2) Contaminated soil removal - Visually contaminated soil present in the bottom of the ponds will be excavated and transported off-site for disposal at a permitted TSD facility.
- 3) Filling of ponds - Soil in the dikes at ponds 1A/1B and 2A/2B will be moved into the ponds and compacted. Additional fill consisting of local clayey soil obtained from an off-site borrow source, will be placed to establish final grades at Ponds 1A/1B and 2A/2B. Pond 3B will be filled with the same clayey soil from the off-site borrow source. The clayey soil fill will be compacted to at least 95 percent of the standard Proctor maximum dry density as determined by ASTM test method No. D-

698. The fill material will be tested in the laboratory to document classification and required as-compacted densities (Proctor testing). Compaction of the fill to the required densities will be confirmed by performing field density tests as the fill is placed. At least one field density test will be performed in each pond for each two-foot accumulation of fill.

- 4) Finish Grades - Grading plans are shown on Drawings CL-103 and CL-104 for ponds 1A/1B and 2A/2B, respectively. Pond 3B will be filled to surrounding grade and the surface graded to direct runoff to a reconstructed catch basin that ties into the existing and additional constructed below grade piping (shown on Drawing CL-102) so that runoff from this area is directed to the concrete ditch upstream of the new discharge point at former ponds 1A/1B. The grading plan for the elimination of Pond 3B is shown on Drawing CL-105. Grading will be field monitored and a survey will be performed to document the final grade. Cross-sections comparing the existing and proposed grade as referenced on the grading plans are shown on Drawing CL-107.
- 5) Installation of additional below-grade piping - Pond 3B collects runoff from a portion of the former drip track area and from the closed Hazardous Waste Management Unit (Pond 3A). The existing stormwater management system includes an underground drainage culvert linked to the ditches and swales used to control stormwater runoff. Underground, 24-inch diameter reinforced concrete pipe and corrugated metal pipe are present on the western side of the site to facilitate the conveyance of stormwater to Pond 1A. The existing piping was designed for the 10-year, 24-hour rainfall event. Because the existing piping system does not accommodate the 25-year, 24-hour design storm required for runoff from the cover of closed pond 3A, an additional 18-inch diameter CMP storm drain will be installed parallel to the existing 24-inch diameter concrete storm drain as shown on Drawing CL-102. Headwall and profile details are shown on Drawings CL-106 and CL-108, respectively.
- 6) Extension of concrete ditches and construction of flow monitoring structure - Construction of extensions to the existing concrete ditches and construction of the

concrete flow monitoring structures will be performed in conjunction with the placement and finish grading of the surface and vegetative layer at former ponds 1A/1B and 2A/2B. The ditch extension and structure has been designed to accommodate the 25-year, 24-hour storm event. A removable, V-notch weir will be constructed within a concrete channel at the discharge points to allow sampling and flow rate determination as may be required under the general NPDES stormwater permit. Flow monitoring structure and ditch details are presented on Drawing CL-109.

- 7) Vegetative Layer and Grassing - A 6-inch thick, surface vegetative soil layer will be placed within the regraded area. This surface layer will be grassed with an appropriate grass mixture for the region and the season in which seeding occurs.

#### **4.0 SCHEDULE**

Implementation of work is contingent upon TDEC and EPA approval. Work will begin shortly after approval is obtained from TDEC and EPA.

#### **5.0 DOCUMENTATION**

Construction will be monitored by an independent engineer retained by the owner. Documentation will include, but not be limited to, the following:

- Field and laboratory quality assurance test data;
- Daily records of construction activity;
- Record photographs; and
- As-built location and topographic maps and details.

A report documenting activities performed to eliminate the retention ponds will be submitted to TDEC and EPA within 90 days of completion of construction.

**ATTACHMENT 1**

**Stormwater Laboratory Reports**

# TECHNICAL LABORATORIES, INC.

515 CHEROKEE BLVD.

CHATTANOOGA, TENNESSEE 37405

MARTIN H. DAVIS  
President

615/285-4533

ACCOUNT NO. 2366-001 DATE MARCH 20, 1992  
RECEIVED FROM SOUTHERN WOOD PIEDMONT COMPANY, P. O. BOX 1368, CHATTANOOGA,  
MR. JIMMY HUDSON TENNESSEE 37401  
RECEIVED DATE 03/12/92  
MATERIAL NPDES DISCHARGE SAMPLE  
MARKED SEE BELOW  
LABORATORY NO. 325,027

pH	8.3
Phenols mg/l	<0.001
Grease & Oil (Partition-Gravimetric) mg/l	7
Dissolved Oxygen mg/l	9.7
5 Day BOD mg/l	1
Total Suspended Solids mg/l	4
Settleable Solids ml/l	0.0

Sample 2B, Sampled at Discharge Pipe, 03/12/92, 1400, By TLI  
Employee 139 and 3, Terry Wheland and Sandra Vance Tennessee  
Water Pollution Control Personnel, Bill Arrants and Jimmy Hudson  
of Southern Wood Piedmont

TECHNICAL LABORATORIES, INC.

*Martin H. Davis*

MARTIN H. DAVIS  
President

ibc

# TECHNICAL LABORATORIES, INC.

515 CHEROKEE BLVD.

MARTIN H. DAVIS  
President

CHATTANOOGA, TENNESSEE 37405

615/265-4533

ACCOUNT NO. 2366-001 DATE MARCH 20, 1992

RECEIVED FROM SOUTHERN WOOD PIEDMONT COMPANY, P. O. BOX 1368, CHATTANOOGA,  
MR. JIMMY HUDSON TENNESSEE 37401

RECEIVED DATE 03/12/92 (VIA TLI PICK UP)

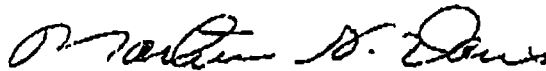
MATERIAL NPDES DISCHARGE SAMPLE

MARKED SAMPLE 2B, SAMPLED AT DISCHARGE PIPE, 03/12/92, 1620, BY TERRY  
WHELAND AND SANDRA VANCE TENNESSEE WATER POLLUTION  
PERSONNEL, BILL ARRANTS AND JIMMY HUDSON OF  
SOUTHERN WOOD PIEDMONT

LABORATORY NO. 325,036

pH	8.3
Phenols mg/l	0.002
Grease & Oil (Partition-Gravimetric) mg/l	4
Dissolved Oxygen mg/l	9.0
5 Day BOD mg/l	1
Total Suspended Solids mg/l	4
Settleable Solids ml/l	0.0

TECHNICAL LABORATORIES, INC.



MARTIN H. DAVIS  
President

ibc

## TECHNICAL LABORATORIES, INC.

515 CHEROKEE BLVD.

CHATTANOOGA, TENNESSEE 37405

615/265-4533

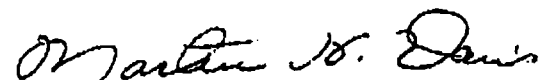
MARTIN H. DAVIS  
President

ACCOUNT NO. 2366-001 DATE MARCH 20, 1992  
RECEIVED FROM SOUTHERN WOOD PIEDMONT COMPANY, P. O. BOX 1368, CHATTANOOGA,  
MR. JIMMY HUDSON TENNESSEE 37401  
RECEIVED DATE 03/12/92  
MATERIAL NPDES DISCHARGE SAMPLE  
MARKED SEE BELOW  
LABORATORY NO. 325,026

pH	8.3
Phenols mg/l	0.001
Grease & Oil (Partition-Gravimetric) mg/l	5
Dissolved Oxygen mg/l	9.0
5 Day BOD mg/l	1
Total Suspended Solids mg/l	3
Settleable Solids ml/l	0.0

Sample 1B, Sampled at Discharge Pipe, 03/12/92, 1315, By TLI  
Employee 139 and 3, Terry Wheland and Sandra Vance Tennessee  
Water Pollution Control Personnel, Bill Arrants and Jimmy Hudson  
of Southern Wood Piedmont

TECHNICAL LABORATORIES, INC.

MARTIN H. DAVIS  
President

ibc

# TECHNICAL LABORATORIES, INC.

515 CHEROKEE BLVD.

MARTIN H. DAVIS  
President

CHATTANOOGA, TENNESSEE 37405

615/265-4533

ACCOUNT NO. 2366-001 DATE MARCH 20, 1992

RECEIVED FROM SOUTHERN WOOD PIEDMONT COMPANY, P. O. BOX 1368, CHATTANOOGA,  
MR. JIMMY HUDSON TENNESSEE 37401

RECEIVED DATE 03/12/92 (VIA TLI PICK UP)

MATERIAL NPDES DISCHARGE SAMPLE

MARKED SAMPLE 1B, SAMPLED AT DISCHARGE PIPE, 03/12/92, 1600, BY TERRY  
WHELAND AND SANDRA VANCE TENNESSEE WATER  
POLLUTION CONTROL PERSONNEL, BILL ARRANTS AND  
JIMMY HUDSON OF SOUTHERN WOOD PIEDMONT

LABORATORY NO. 325,034

pH	8.3
Phenols mg/l	0.002
Grease & Oil (Partition-Gravimetric) mg/l	7
Dissolved Oxygen mg/l	8.9
5 Day BOD mg/l	1
Total Suspended Solids mg/l	3
Settleable Solids ml/l	0.0

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MARTIN H. DAVIS  
President

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515 CHEROKEE BLVD.

MARTIN H. DAVIS  
President

CHATTANOOGA, TENNESSEE 37405

615/265-4533

ACCOUNT NO. 2366-001 DATE MARCH 20, 1992

RECEIVED FROM SOUTHERN WOOD PIEDMONT COMPANY, P. O. BOX 1368, CHATTANOOGA,  
MR. JIMMY HUDSON TENNESSEE 37401

RECEIVED DATE 03/12/92 (VIA TLI PICK UP)

MATERIAL NPDES DISCHARGE SAMPLE

MARKED SEE BELOW

LABORATORY NO. 325,035

pH	8.4
Phenols mg/l	0.001
Grease & Oil (Partition-Gravimetric) mg/l	3
Dissolved Oxygen mg/l	8.9
5 Day BOD mg/l	1
Total Suspended Solids mg/l	2
Settleable Solids ml/l	0.0

Sample 1B, Sampled at Discharge Pipe, 03/12/95, 1810, By TLI  
Employee 3, Terry Wheland and Sandra Vance Tennessee Water  
Pollution Personnel, Bill Arrants and Jimmy Hudson of Southern  
Wood Piedmont

TECHNICAL LABORATORIES, INC.

MARTIN H. DAVIS  
President

ibc



## Southern Wood Piedmont Company

November 16, 1994

Mr. Phillip L. Stewart  
Tennessee Dept. of Environment and Conservation  
540 McCallie Avenue, Suite 550  
Chattanooga, TN 37402-2013

Re: NPDES Permit No. TN0028380  
Hamilton County

Dear Mr. Stewart:

Enclosed with this letter are sample analyses results for tests completed according to the request made in your letter of April 18, 1994. This was site superintendent Jim Hudson's first opportunity to meet the sample protocol of the Tennessee Baseline General Permit. Samples were collected from the influent to pond 1A and from the effluent from pond 3B. Due to plant logistics and the time of the beginning of flow for each discharge point, it was impossible to obtain samples from the influent to pond 2A during this storm event. 2A influent samples will be obtained at the next opportunity.

Samples from pond 1A were collected at the point where the culvert from the concrete ditch enters the pond. Samples from pond 3B were collected, beginning approximately 5-10 minutes after the pump turned on, from the sump pump station manhole located next to pond 3B. This was possible because the automatic pump which pumps water from pond 3B to the POTW sewer came on much later than the first observed flow into pond 1A. Samples were grabbed from influent sump water before the water entered the pump.

Samples were analyzed for all parameters included in the current NPDES permit as well as those outlined in the general permit rule except pentachlorophenol, total arsenic, total chromium, and total copper. Creosote was the only preservative used at this facility when it was in operation. Arsenic, chromium and copper, in addition to pentachlorophenol, were not used at the site as wood preservatives at any time during plant operations. The text in section 7.b.2.vii, therefore, is not applicable to the Chattanooga site. SWP did analyze for Chemical Oxygen Demand. I discussed these facts with Mr. Vojin Janjic by telephone after receiving your letter.

All parameters analyzed for met the requirements of NPDES permit TN0028380 with the exception of dissolved oxygen from the pond 3B discharge. The low dissolved oxygen in the discharge (4.1 mg/l compared to the permit limit of a minimum of 5.0 mg/l) was probably due to the water's residence time in the pond and the lack of aeration in the pond. SWP would like to close pond 3B and discharge directly into Chattanooga Creek the surface flow that presently runs into the pond. The dissolved oxygen in surface flow presently entering 3B should be greater than the level found in the pond 3B discharge.

SWP will submit analytical results from samples obtained from the influent to pond 2A as soon as possible. Please call me at 803-599-1078 if you have any questions or comments regarding the data submitted with this letter.

Sincerely,



William P. Arrants  
Environmental Compliance &  
Safety Manager

CC: T. M. Davis  
M. D. Pruett  
J. L. Hudson

tnnpdes

**SL SAVANNAH LABORATORIES**  
& ENVIRONMENTAL SERVICES, INC.

2/01/94  
MAS  
WPA → JH

2 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

RECEIVED

LOG NO: S4-45765

Received: 24 OCT 94

Ms. Sandra Watson  
Southern Wood Piedmont (CH)  
P.O. BOX 5447  
Spartanburg, SC 29304

NOV 6 9 1994

ENVIRONMENTAL

CC: Steve Blevins

Project: Chattanooga, TN  
Sampled By: Client

REPORT OF RESULTS

Page 1

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
45765-1	# 12186 Stormwater Discharge Samp to POTW (3B)	10-19-94
PARAMETER	45765-1	
Biochemical Oxygen Demand (5 Day) (405.1), mg/l	ND	
Suspended Solids (160.2), mg/l	5.0	
Ammonia-N, mg/l	0.63	
Chemical Oxygen Demand (410.2), mg/l	23	
units	7.3	
Dissolved Oxygen, mg/l	4.1	
Phenolics, Total Recoverable, mg/l	ND	
Oil & Grease (413.2), mg/l	ND	

# SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

02 LaRoche Avenue • Savannah, GA 31404 • (912) 352-7858 • Fax (912) 352-0165

LOG NO: S4-45765

Received: 24 OCT 94

Ms. Sandra Watson  
Southern Wood Piedmont (CH)  
P.O. BOX 5447  
Spartanburg, SC 29304

CC: Steve Blevins

Project: Chattanooga, TN  
Sampled By: Client

## REPORT OF RESULTS

Page 2

### LOG NO SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES

45765-2 Method Blank  
45765-3 Detection Limits  
45765-4 Accuracy (mean % recovery)  
45765-5 Precision (% RPD)  
45765-6 Analyst Initials

PARAMETER	45765-2	45765-3	45765-4	45765-5	45765-6
Biochemical Oxygen Demand (5 Day) (405.1), mg/l	ND	2.0	109 %	5.5 %	AW
Suspended Solids (160.2), mg/l	ND	5.0	98 %	3.0 %	AW
Ammonia-N, mg/l	ND	0.030	103 %	0.97 %	TH
Chemical Oxygen Demand (410.2), mg/l	ND	20	94 %	1.1 %	AW
pH, units	---	---	96 %	0 %	AW
Dissolved Oxygen, mg/l	---	1.0	---	---	AW
Phenolics, Total Recoverable, mg/l	ND	0.010	89 %	9.0 %	TH
Oil & Grease (413.2), mg/l	ND	1.0	115 %	3.5 %	TH

# SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

2 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7358 Fax (912) 352-0165

LOG NO: S4-45765

Ms. Sandra Watson  
Southern Wood Piedmont (CH)  
P.O. BOX 5447  
Spartanburg, SC 29304

RECEIVED  
NOV 09 1994  
ENVIRONMENTAL

Received: 24 OCT 94

CC: Steve Blevins

Project: Chattanooga, TN  
Sampled By: Client

## REPORT OF RESULTS

Page 3

LOG NO SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES

45765-7 EPA Method Number  
45765-8 Date Extracted  
45765-9 Date Analyzed

PARAMETER	45765-7	45765-8	45765-9
Biochemical Oxygen Demand (5 Day) (405.1)	405.1	---	10.25.94
Suspended Solids (160.2)	160.2	---	10.25.94
Ammonia-N	350.1	---	10.26.94
Chemical Oxygen Demand (410.2)	410.1	---	10.24.94
...	150.1	---	10.24.94
Dissolved Oxygen	360.1	---	10.24.94
Phenolics, Total Recoverable	9065	---	10.27.94
Oil & Grease (413.2)	413.2	10.25.94	10.25.94

# SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

2 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7438 • Fax (912) 352-0165

LOG NO: S4-45765

Received: 24 OCT 94

Ms. Sandra Watson  
Southern Wood Piedmont (CH)  
P.O. BOX 5447  
Spartanburg, SC 29304

CC: Steve Blevins

Project: Chattanooga, TN  
Sampled By: Client

## REPORT OF RESULTS

Page 4

LOG NO SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES

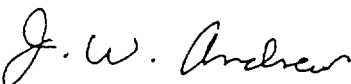
45765-10 Report Completion Date

PARAMETER 45765-10

Date Reported 11.03.94

Methods: EPA SW-846

ND = Not Detected

  
J. W. Andrews, Ph. D.

Final Page Of Report

SL

SAVANNAH LABORATORIES AND ENVIRONMENTAL SERVICES, INC.

## ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Savannah Division  
5102 LaRoche Avenue  
Savannah, GA 31404  
Phone: (912) 354-7058

JOB NO.		P.O. NO.		PROJECT NAME		REQUIRED ANALYSES										PAGE	OF												
CLIENT NAME		TELEPHONE		CLIENT ADDRESS		CLIENT PROJECT MANAGER		SAMPLING		SAMPLE ID		AQUEOUS MATRIX		NONAQUEOUS MATRIX		STANDARD		RUSH		DATE REPORT REQUESTED		REMARKS							
SOUTHERN WOOD PIEDMONT		266-5628		400 W 33 <sup>RD</sup> P/O BOX 1368 CHATTANOOGA TN 37401		MR BILL ARRANTS		DATE TIME		I.D.		5-DAY B.O.D.		TOTAL SUSPENDED SOLIDS		AMMONIA AS NITROGEN		CHEMICAL OXYGEN DEMAND		P.H.		DISSOLVED OXYGEN		TOTAL RECOVERABLE PHE NOLICS		OIL/GREASE GRAB SAMPLE		REMARKS	
10/19/94 4:00 PM		12186																						PLEASE SEE CHAIN OF CUSTODY SHEET.					
																								SENT RESULTS TO MR BILL ARRANTS					
																								P/O BOX 5447					
																								SPARTANBURG S.C.					
																								29304					
RECEIVED BY: (SIGNATURE)				DATE/TIME		RECEIVED BY: (SIGNATURE)				DATE/TIME		RELINQUISHED BY: (SIGNATURE)				DATE/TIME		RECEIVED BY: (SIGNATURE)				DATE/TIME		RELINQUISHED BY: (SIGNATURE)				DATE/TIME	
L. Bonds				10/19/94 4:00 PM																									
LABORATORY USE ONLY																													
RECEIVED FOR LABORATORY BY: (SIGNATURE)				DATE/TIME		CUSTODY CONTACT (YES/NO)		CUSTODY SEAL NO.		SL LOG NO.		LABORATORY REMARKS:																	
L. Bonds				10/24/94 1:40 PM		( ) NO				45765																			

RECEIVED

NOV-09-1994

Company/Location SAN LUCAS DIEDITION T CHATHAM 00917, TN

Sample Location: 3-B Discharge Sump TO POTW

Collector's Name: Jimmy L. Hudson

Sample Date: 10-19-94

Field Information: pH 7.9 Conductance \_\_\_\_\_ Temp. 66°

Wastewater \_\_\_\_\_ Soil \_\_\_\_\_ Sludge \_\_\_\_\_ <sup>Storm</sup> Groundwater ✓

Analysis Requested: 5-DAY BIOCHEMICAL OXYGEN DEMAND, TOTAL SUSPENDED SOLIDS, AMMONIA AS NITROGEN, CHEMICAL OXYGEN DEMAND, P. H., DISSOLVED OXYGEN, TOTAL RECOVERABLE PHENOLICS  
OIL + GREASE GRAB SAMPLE

LAB ID #

54-45765

SWP Identification No. Time 8:50<sup>AM</sup> 10/20/94

12186

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Chain of Possession

<u>[Signature]</u>	<u>10/20/94 4:00 PM</u>	<u>L. Bonds</u>	<u>10-24-94 1:46 pm</u>
Relinquished by	Date/Time	Received By	Date/Time
_____	<u>1111</u>	_____	_____
Relinquished by	Date/Time	Received By	Date/Time

Method of Shipment: \_\_\_\_\_ Container sealed before shipment: \_\_\_\_\_  
Internal Temp. of Container: \_\_\_\_\_ Container sealed upon receipt: \_\_\_\_\_  
Before shipping On receipt

**SL SAVANNAH LABORATORIES**  
& ENVIRONMENTAL SERVICES, INC.

WPA → JH

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

RECEIVED

NOV 11 1994

LOG NO: S4-45720

Received: 20 OCT 94

Ms. Sandra Watson  
Southern Wood Piedmont (CH)  
P.O. BOX 5447  
Spartanburg, SC 29304

ENVIRONMENTAL AF.

CC: Steve Blevins

Project: Chattanooga, TN  
Sampled By: Client

REPORT OF RESULTS

Page 1

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
45720-1	Stormwater Sampling (# 12185)	10-19-94
PARAMETER	45720-1	
Biochemical Oxygen Demand (5 Day) (405.1), mg/l	2.5	
Suspended Solids (160.2), mg/l	16	
Ammonia-N, mg/l	0.56	
Chemical Oxygen Demand (410.2), mg/l	ND	
pH, units	7.7	
Dissolved Oxygen, mg/l	11	
Solids, Total Recoverable, mg/l	ND	
Oil & Grease (413.2), mg/l	ND	

# SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

RECEIVED

LOG NO: S4-45720

Received: 20 OCT 94

Ms. Sandra Watson  
Southern Wood Piedmont (CH)  
P.O. BOX 5447  
Spartanburg, SC 29304

NOV 11 1994

ENVIRONMENTAL

CC: Steve Blevins

Project: Chattanooga, TN  
Sampled By: Client

## REPORT OF RESULTS

Page 2

### LOG NO SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES

45720-2 Method Blank  
45720-3 Detection Limits  
45720-4 Accuracy (mean % recovery)  
45720-5 Precision (% RPD)  
45720-6 Analyst Initials

PARAMETER	45720-2	45720-3	45720-4	45720-5	45720-6
Biochemical Oxygen Demand (5 Day) (405.1), mg/l	ND	2.0	107 %	0 %	AW
Suspended Solids (160.2), mg/l	ND	5.0	98 %	4.1 %	AW
Ammonia-N, mg/l	ND	0.030	101 %	0.99 %	AW
Chemical Oxygen Demand (410.2), mg/l	ND	20	92 %	1.1 %	AW
pH, units	---	---	96 %	0 %	AW
Dissolved Oxygen, mg/l	---	0.10	---	---	AW
Phenolics, Total Recoverable, mg/l	ND	0.010	89 %	9.0 %	MM
Oil & Grease (413.2), mg/l	ND	1.0	115 %	3.5 %	TH

# SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (904) 382-7858 • Fax: (912) 352-0165

RECEIVED

LOG NO: S4-45720

NOV 11 1994

Received: 20 OCT 94

Ms. Sandra Watson  
Southern Wood Piedmont (CH)  
P.O. BOX 5447  
Spartanburg, SC 29304

ENVIRONMENTAL

CC: Steve Blevins

Project: Chattanooga, TN  
Sampled By: Client

## REPORT OF RESULTS

Page 3

### LOG NO SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES

45720-7 EPA Method Numbers  
45720-8 Date Extracted  
45720-9 Date Analyzed

PARAMETER	45720-7	45720-8	45720-9
Biochemical Oxygen Demand (5 Day) (405.1)	405.1	---	10.21.94
Suspended Solids (160.2)	160.2	---	10.21.94
Ammonia-N	350.1	---	10.26.94
Chemical Oxygen Demand (410.2)	410.1	---	10.21.94
Unsoluble Oxygen	150.1	---	10.20.94
Dissolved Oxygen	360.1	---	10.20.94
Phenolics, Total Recoverable	9065	---	10.27.94
Oil & Grease (413.2)	413.2	10.25.94	10.25.94

# SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

RECEIVED

LOG NO: S4-45720

Received: 20 OCT 94

Ms. Sandra Watson  
Southern Wood Piedmont (CH)  
P.O. BOX 5447  
Spartanburg, SC 29304

NOV 11 1994

CC: Steve Blevins

Project: Chattanooga, TN  
Sampled By: Client

## REPORT OF RESULTS

Page 4

LOG NO SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES

45720-10 Report Completion Date

PARAMETER 45720-10

Date Reported 11.09.94

Methods: EPA SW-846

ND = Not Detected

*J. W. Andrews*

J. W. Andrews, Ph. D.

Final Page Of Report

SL

SAVANNAH LABORATORIES AND ENVIRONMENTAL SERVICES, INC.

## ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Savannah Division  
5102 LaRoche Ave.  
Savannah, GA 31406  
Phone: (912) 354-7858

JOB NO.		P.O. NO.		PROJECT NAME		REQUIRED ANALYSES										PAGE		OF															
				1-A - General Permit																													
CLIENT NAME				TELEPHONE				AQUEOUS MATRIX		NONAQUEOUS MATRIX		5-DAY B.O.D.		TOTAL SUSPENDED SOLIDS		AMMONIA AS NITROGEN		CHEMICAL OXYGEN DEMAND		P.H.		DISSOLVED OXYGEN		TOTAL RECOVERABLE PHENOLICS		GRAB SAMPLE OIL/GREASE		STANDARD <input checked="" type="checkbox"/>		RUSH <input type="checkbox"/>		DATE REPORT REQUESTED	
SOUTHERN WOOD PIEDMONT				266-5628																													
CLIENT ADDRESS				CHATTANOOGA																													
400 W 33 <sup>RD</sup> P/O BOX 1368				TN 37401																													
CLIENT PROJECT MANAGER																																	
MR. BILL ARRANTS																																	
SAMPLING				SAMPLE ID																													
DATE		TIME																															
10/17/94		11:00 <sup>AM</sup>		ID. 12185																													
										</																							

Company/Location Sou Glaxo PIEDMONT (GENERAL PERMIT) 45720

Sample Location: 1-A STORMWATER DITCH

Collector's Name: Timmy L. HUDSON

Sample Date: 10-19-94

Field Information: pH 7.7 Conductance \_\_\_\_\_ Temp. 59°

Wastewater \_\_\_\_\_ Soil \_\_\_\_\_ Sludge \_\_\_\_\_ <sup>Storm</sup> Groundwater ✓

Analysis Requested: 5-DAY BIOCHEMICAL OXYGEN DEMAND, TOTAL SUSPENDED

SOLIDS, AMMONIA AS NITROGEN, CHEMICAL OXYGEN DEMAND, P. H.,  
DISSOLVED OXYGEN, TOTAL RECOVERABLE PHENOLICS

OIL + GREASE  
GRAB SAMPLE

LAB ID # \_\_\_\_\_

SWP Identification No. \_\_\_\_\_ Time 11:00 AM 10/19/94

I.P. 12185

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Chain of Possession

Timmy L. Hudson Relinquished by 10/19/94 4:00 PM /Date/Time 1111 Received By \_\_\_\_\_ Date/Time \_\_\_\_\_

Relinquished by \_\_\_\_\_ Date/Time 1111 Received By \_\_\_\_\_ Date/Time \_\_\_\_\_

Method of Shipment: EMERY TRUCK Container sealed before shipment: YES  
Container sealed upon receipt: \_\_\_\_\_

Internal Temp. of Container: \_\_\_\_\_ Before shipping \_\_\_\_\_ On receipt \_\_\_\_\_

## SOUTHERN WOOD PIEDMONT

## NPDES STORM WATER SAMPLING FIELD FORM

SITE NAME:

CHATTANOOGA TN

OUTFALL LOCATION:

L-R STORM WATER N.P.D.S POND

DATE:

10-19-94

## GENERAL RAINFALL EVENT CONDITIONS:

Rainfall Started:

Date:

10/19/94

Time:

8:00 AM

First Flow Thru Outfall Observed:

Date:

10/19/94

Time:

10:00 AM

Last Rainfall (&gt; or = 0.1 inch)

Date:

10/14/94

Time:

2:00 PM

Hours Since Last Rain Event:

116 HRS

GRAB SAMPLE (To be collected during the first 30 minutes of discharge)

Sample Time: 10:13 AM7.7 pH59° Temperature

Sampler/Tester's Signature:

J. L. Hudson

TIME WEIGHTED COMPOSITE SAMPLE (3 samples per hour taken a minimum of 15 minutes apart)

GRAB NO. HOUR

TIME

INITIALS

COMMENTS

1

①10:15 AMJLH

2

1

3

1

4

②10:30 AMJLH

5

2

6

2

7

③10:45 AMJLH

8

3

9

3

## STORM EVENT DATA:

Temperature:

52°

Total Rainfall During Sampling:

1.5

Total Rainfall-inches:

1.6

Duration of Storm-hours:

8 HRS

Total Flow during Storm:

Samplers Signature

J. L. Hudson

## SOUTHERN WOOD PIEDMONT

## NPDES STORM WATER SAMPLING FIELD FORM

SITE NAME:

CHATTANOOGA TN

OUTFALL LOCATION:

3-A DISCHARGE SUMP TO POTW

DATE:

10-19-94

## GENERAL RAINFALL EVENT CONDITIONS:

Rainfall Started:

Date:

10/19/94

Time:

8:00 AM

First Flow Thru Outfall Observed:

Date:

10/19/94

Time:

3:15 PM

Last Rainfall (&gt; or = 0.1 inch)

Date:

10/14/94

Time:

2:00 PM

Hours Since Last Rain Event:

116 HRS

GRAB SAMPLE (To be collected during the first 30 minutes of discharge)

Sample Time: 3:21 PM7.9 pH66° Temperature

Sampler/Tester's Signature:

Jerry L. Harkins

TIME WEIGHTED COMPOSITE SAMPLE (3 samples per hour taken a minimum of 15 minutes apart)

GRAB NO.	HOUR	TIME	INITIALS	COMMENTS
1	①	<u>3:30 PM</u>		
2	1			
3	1			
4	②	<u>3:45 PM</u>		
5	2			
6	2			
7	③	<u>4:00 PM</u>		
8	3			
9	3			

## STORM EVENT DATA:

Temperature:

64°

Total Rainfall During Sampling:

5.1

Total Rainfall-inches:

1.6

Duration of Storm-hours:

8 HRS

Total Flow during Storm:

Samplers Signature

Jerry L. Harkins



## Southern Wood Piedmont Company

January 11, 1995

Mr. Phillip L. Stewart  
Tennessee Department of Environment and Conservation  
540 McCallie Avenue, Suite 550  
Chattanooga, TN 37402-2013

Re. NPDES Permit No. TN0028380  
Hamilton County

Dear Mr. Stewart:

Enclosed with this letter are sample analyses results for the final test of site stormwater as required by your letter of April 18, 1994. The analyses results included herein are from a sample of the stormwater influent to pond 2A. The sample was collected from the outfall side of the culvert that empties into pond 2A. The sample was collected by Mr. Jim Hudson on December 10, 1994 according to the protocol of the Tennessee Baseline General Permit.

The analyses results show water quality that meets the parameter quality requirements of the Tennessee Baseline General Permit and also the site's individual NPDES permit. Stormwater sample analyses results from pond 1A influent and pond 3B effluent were reported in my November 16, 1994 letter to you.

Please review these analyses results and consider SWP's proposal to discharge the stormwater from the sampled sources directly to Chattanooga Creek under the terms of a Tennessee Baseline General Permit. This would allow SWP to close the present NPDES pond system, and also reduce the site's stormwater effluent to the city sewer.

Please contact me at the above letterhead or at 803-599-1078 if you have questions or comments.

Sincerely,

A handwritten signature in black ink, appearing to read 'W. P. Arrants'.

W. P. Arrants  
Environmental Compliance &  
Safety Manager

3339bw

CC: T. M. Davis  
M. D. Pruett  
J. L. Hudson

**SL SAVANNAH LABORATORIES**  
& ENVIRONMENTAL SERVICES, INC.

*grou*  
*MAS*  
*WPA*

7102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

**RECEIVED**

LOG NO: S4-46757

JAN 09 1995

Received: 13 DEC 94

Ms. Sandra Watson  
Southern Wood Piedmont (CH)  
P.O. BOX 5447  
Spartanburg, SC 29304

SOUTHERN WOOD PIEDMONT

CC: Steve Blevins

Project: Chattanooga, TN  
Sampled By: Client

*sewer water Discharge Pipe*  
*3 Pond 2A --- NPDES*

REPORT OF RESULTS

Page 1

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
46757-1	# 12277	12-10-94
PARAMETER	46757-1	
Biochemical Oxygen Demand (5 Day) (405.1), mg/l	4.7	
Suspendid Solids (160.2), mg/l	12	
Ammonia-N, mg/l	0.70	
Chemical Oxygen Demand (410.2), mg/l	40	
pH, units	7.4	
l & Grease (413.2), mg/l	ND	
isolved Oxygen, mg/l	7.6	
nenolics, Total Recoverable, mg/l	ND	

# SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

22 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

RECEIVED

LOG NO: S4-46757

Ms. Sandra Watson  
Southern Wood Piedmont (CH)  
P.O. BOX 5447  
Spartanburg, SC 29304

JAN 09 1995

Received: 13 DEC 94

SOUTHERN WOOD PIEDMONT

CC: Steve Blevins

Project: Chattanooga, TN  
Sampled By: Client

## REPORT OF RESULTS

Page 2

### LOG NO SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES

46757-2 Method Blank  
46757-3 Detection Limits  
46757-4 Accuracy (mean % recovery)  
46757-5 Precision (% RPD)  
46757-6 Analyst Initials

PARAMETER	46757-2	46757-3	46757-4	46757-5	46757-6
Biochemical Oxygen Demand (5 Day) (405.1), mg/l	ND	2.0	115 %	0.87 %	AW
Suspended Solids (160.2), mg/l	ND	5.0	90 %	1.1 %	AW
Ammonia-N, mg/l	ND	0.030	98 %	1.0 %	AW
Chemical Oxygen Demand (410.2), mg/l	ND	20	89 %	2.2 %	AW
pH, units	---	---	96 %	0 %	AW
Dissolved Oxygen, mg/l	---	0.10	---	---	AW
Phenolics, Total Recoverable, mg/l	ND	0.010	86 %	0 %	MM
Oil & Grease (413.2), mg/l	ND	1.0	96 %	0 %	MM

# SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

72 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

RECEIVED

LOG NO: S4-46757

Received: 13 DEC 94

Ms. Sandra Watson  
Southern Wood Piedmont (CH)  
P.O. BOX 5447  
Spartanburg, SC 29304

JAN 09 1995

SOUTHERN WOOD PIEDMONT

CC: Steve Blevins

Project: Chattanooga, TN  
Sampled By: Client

## REPORT OF RESULTS

Page 3

LOG NO SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES

46757-7 EPA Method Numbers  
46757-8 Dates Extracted  
46757-9 Dates Analyzed

PARAMETER	46757-7	46757-8	46757-9
Biochemical Oxygen Demand (5 Day) (405.1)	405.1	---	12.14.94
Suspended Solids (160.2)	160.2	---	12.14.94
Ammonia-N	350.1	---	12.23.94
Chemical Oxygen Demand (410.2)	410.1		12.15.94
	150.1	---	12.14.94
solvent Oxygen	360.1	---	12.14.94
Solids, Total Recoverable	420.1	---	12.29.94
Grease (413.2)	413.2	12.15.94	12.15.94

**SL SAVANNAH LABORATORIES**  
& ENVIRONMENTAL SERVICES, INC.

LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S4-46757

**RECEIVED**

Received: 13 DEC 94

Ms. Sandra Watson  
Southern Wood Piedmont (CH)  
P.O. BOX 5447  
Spartanburg, SC 29304

JAN 09 1995  
SOUTHERN WOOD PIEDMONT

CC: Steve Blevins

Project: Chattanooga, TN  
Sampled By: Client

REPORT OF RESULTS

Page 4

LOG NO SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES

46757-10 Report Completion Date

PARAMETER 46757-10

Date Reported 01.03.95

Methods: EPA SW-846

ND = Not Detected

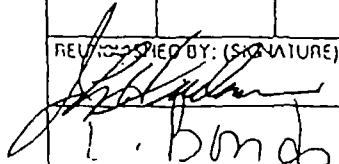
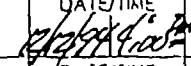
J. W. Andrews (GF)  
J. W. Andrews, Ph. D.

Final Page Of Report

# SL SAVANNAH LABORATORIES AND ENVIRONMENTAL SERVICES, INC.

## ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Savannah Division  
5102 LaRoche Avenue  
Savannah, GA 31404  
Phone: (912) 354-7058

JOB NO.		P.O. NO.		PROJECT NAME <b>2-A GENERAL PERMIT</b>								PAGE		OF					
				<b>STORM WATER SAMPLING N.P.D.'S DISCHARGE PIPE</b>															
CLIENT NAME				TELEPHONE				REQUIRED ANALYSES											
SOUTHERN WOOD PIEDMONT				366-5628				AQUEOUS MATRIX NONAQUEOUS MATRIX 5-DAY B.O.D. TOTAL SUSPENDED SOLIDS AMMONIA AS NITROGEN CHEMICAL OXYGEN DEMAND P.H. DISSOLVED OXYGEN TOTAL RECOVERABLE PHENOLICS OIL/GREASE GRAB SAMPLE								STANDARD			
CLIENT ADDRESS				CHATTANOOGA												RUSH			
400 W 33 <sup>RD</sup> P/O BOX 1368				TN 37401												DATE REQUEST		JAN 09 1995	
CLIENT PROJECT MANAGER																REMARKS			
MR. BILL HARRANTS																			
SAMPLING				SAMPLE ID															
DATE	TIME																		
12/10/94	9:00 AM			I.D. - 12277															
RECEIVED BY: (SIGNATURE)				DATE/TIME		RECEIVED BY: (SIGNATURE)				DATE/TIME		RELINQUISHED BY: (SIGNATURE)				DATE/TIME			
				12/13/94 4:40 PM															
LABORATORY USE ONLY																			
RECEIVED FOR LABORATORY BY: (SIGNATURE)				DATE/TIME		CUSTODY		CUSTODY SEAL NO.		SL LOG NO.		LABORATORY REMARKS:							
L. Bonds				12/13/94 4:30 PM		EFFECT YES NO				46757									

SOUTHERN WOOD PIEDMONT

RECEIVED

Company/Location SAN MARCO DIE DITION T

Sample Location: H.P.D.E.S DISCHARGE PIPE TO POND 2-A

Collector's Name: TIMMY L. HUDSON

Sample Date: 12-10-94

Field Information: pH 7.9 Conductance \_\_\_\_\_ Temp. 52°

Wastewater \_\_\_\_\_ Soil \_\_\_\_\_ Sludge \_\_\_\_\_ Storm Groundwater ✓

Analysis Requested: 5-DAY BIOCHEMICAL OXYGEN DEMAND, TOTAL SUSPENDED SOLIDS, AMMONIA AS NITROGEN, CHEMICAL OXYGEN DEMAND, D.H. DISSOLVED OXYGEN, TOTAL RECOVERABLE PHENOLICS  
OIL + GREASE  
GRAB SAMPLE

LAB ID # \_\_\_\_\_

SWP Identification No. \_\_\_\_\_ Time 9:00 AM?

I.D. NUMBER 12277

Chain of Possession

[Signature] 12/12/94 4:01 PM L. Bonds 54-46757 12/13/94 4:30 PM  
Relinquished by Date/Time Received By Date/Time

\_\_\_\_\_  
Relinquished by Date/Time Received By Date/Time

Method of Shipment: \_\_\_\_\_

Container sealed before shipment: \_\_\_\_\_

Internal Temp. of Container: \_\_\_\_\_

Container sealed upon receipt: \_\_\_\_\_

Before shipping \_\_\_\_\_

On receipt \_\_\_\_\_

**RECEIVED**

JAN 09 1995

## SOUTHERN WOOD PIEDMONT

## NPDES STORM WATER SAMPLING FIELD FORM

SITE NAME:

SOUTHERN WOOD PIEDMONT CHATT, TN

OUTFALL LOCATION:

N.P.D.E.S. DISCHARGE PIPE TO POND 2-A

DATE:

12-10-94

## GENERAL RAINFALL EVENT CONDITIONS:

Rainfall Started:

Date:

12-10-94

Time:

5:30 AM

First Flow Thru Outfall Observed:

Date:

12-10-94

Time:

8:04 AM

Last Rainfall (&gt; or = 0.1 inch)

Date:

12-5-94

Time:

7:00 AM

Hours Since Last Rain Event:

118.5 HRS

## GRAB SAMPLE (To be collected during the first 30 minutes of discharge)

Sample Time: 8:12 AM7.9 pH52° Temperature

Sampler/Tester's Signature:

[Signature]

## TIME WEIGHTED COMPOSITE SAMPLE (3 samples per hour taken a minimum of 15 minutes apart)

GRAB NO.	HR	TIME	INITIALS	COMMENTS
1	①	<u>8:15 AM</u>	<u>JAK</u>	
2	1			
3	1			
4	②	<u>8:30 AM</u>	<u>JAK</u>	
5	2			
6	2			
7	③	<u>8:45 AM</u>	<u>JAK</u>	
8	3			
9	3			

## STORM EVENT DATA:

Temperature:

49°

Total Rainfall During Sampling:

1.1

Total Rainfall-inches:

1.2

Duration of Storm-hours:

13 HRS

Total Flow during Storm:

Samplers Signature

[Signature]

P.O. Box 5447  
Spartanburg, S.C. 29304  
Phone: (803) 599-1070  
FAX: (803) 599-1087



## Southern Wood Piedmont Company

October 17, 1995

Tennessee Dept. of Environment and Conservation  
Division of Water Pollution Control  
Attn: Compliance and Enforcement  
6th Floor L & C Annex  
401 Church Street  
Nashville, TN 37243-1534

Re: TNR001832 Stormwater Monitoring Report

Dear Sir/Madame:

The attached Storm Water Monitoring Report for the 10/1/94 to 9/30/95 monitoring year is submitted for the SWP - Chattanooga NPDES Storm Water Permit number TNR001832.

Sincerely,

A handwritten signature in black ink, appearing to read 'W. P. Arrants', with a long horizontal flourish extending to the right.

W. P. Arrants  
Environmental Compliance &  
Safety Manager

CC: T. M. Davis  
M. D. Pruett  
J. L. Hudson

3555bw



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
STORM WATER MONITORING REPORT  
MONITORING YEAR 10/1/94 TO 9/30/95

PAGE 1 OF 1

FACILITY NAME SOUTHERN WOOD PIEDMONT COMPANY  
ADDRESS 400 W. 33rd STREET  
CITY Chattanooga COUNTY Hamilton

NPDES PERMIT NUMBER TNR001832  
CONTACT PERSON William P. Arraras  
PHONE NUMBER (803) 599-1070 ext. 103

TOTAL NUMBER OF FACILITY OUTFALLS THAT CONVEY "STORM  
WATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY":

TOTAL NUMBER OF ABOVE OUTFALLS SAMPLED DURING THE MONITORING YEAR:

TOTAL NUMBER OF STORM EVENTS SAMPLED:

(5) Five  
(1) One  
(1) One

Note: Read instructions on back  
before completing this form.

PROVIDE THE FOLLOWING INFORMATION FOR EACH OUTFALL SAMPLED THIS YEAR:

- A.....DRAINAGE AREA OF OUTFALL  
B.....PERCENTAGE OF DRAINAGE AREA DEFINED AS INDUSTRIAL ACTIVITY  
C.....PERCENTAGE OF DRAINAGE AREA ON YOUR PROPERTY CONSISTING OF IMPERVIOUS SURFACES (CONCRETE, PAVEMENT, ROOF, PONDS)  
D.....PERCENTAGE OF DRAINAGE AREA ON YOUR PROPERTY CONSISTING OF VEGETATION (FOREST, LAWN, FIELD)  
E.....PERCENTAGE OF DRAINAGE AREA CONSISTING OF GRAVEL OR OTHER SURFACES  
F.....RAINFALL AMOUNT OF THE STORM EVENT SAMPLED; IF TWO OR MORE EVENTS WERE SAMPLED, REPORT THE HIGHER OR HIGHEST AMOUNT.

OUTFALL NO. 5, 0, 1 A 20.5 ☐ SQ FEET ☒ ACRES  
B 100 % C 1.4 % D 77.0 % E 21.6 % F 0.9 INCHES

PARAMETER	QUALITY OR CONCENTRATION			REPORT LEVEL	UNITS	NO. OF SAMPLES	SAMPLE TYPE
	MINIMUM	AVERAGE	MAXIMUM				
BOD, 5-DAY (00310)	7	7	7	50	mg/l	1	COMP.
TOTAL SOLIDS (00530)	32	32	32	200	mg/l	1	COMP.
NITROGEN, AMMONIA (00610)	0.43	0.43	0.43	4	mg/l	1	COMP.
OIL AND GREASE (00550)	2	2	2	15	mg/l	1	GRAB
pH (00400)	7.3	7.3	7.3	4.0 - 9.0	stand.	1	GRAB

HAS A STORM WATER POLLUTION PREVENTION PLAN BEEN PREPARED FOR THIS FACILITY? ☒ YES ☐ NO

HAS THE PLAN BEEN SIGNED BY A PERSON WHO MEETS THE SIGNATORY REQUIREMENTS OF THE PERMIT? ☒ YES ☐ NO

HAS THE PLAN BEEN IMPLEMENTED? ☒ YES ☐ NO

HAVE YOUR STORM WATER OUTFALLS BEEN TESTED FOR UNPERMITTED, NON-STORM WATER DISCHARGES? ☒ YES ☐ NO

ARE THERE ANY UNPERMITTED, NON-STORM WATER DISCHARGES PRESENT? ☐ YES ☒ NO  
IF SO, ATTACH RESULTS OF YOUR INVESTIGATION.

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE  
INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT  
THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT.

TITLE PRINCIPAL EXECUTIVE OFFICER

T.M. DAVIS - MSR OF ENV. AFFAIRS  
TYPED OR PRINTED

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

DATE

10 17 95  
YEAR MONTH DAY

*Bill*

# TECHNICAL LABORATORIES, INC.

515 CHEROKEE BLVD.  
CHATTANOOGA, TENNESSEE 37405

MARTIN H. DAVIS  
President

615/265-4533

ACCOUNT NO. 2366-002 DATE SEPTEMBER 28, 1995  
RECEIVED FROM SOUTHERN WOOD PIEDMONT COMPANY, P. O. BOX 1368, CHATTANOOGA,  
MR. JIMMY HUDSON TENNESSEE 37401  
RECEIVED DATE 09/21/95  
MATERIAL STORM WATER  
MARKED SWP I.D. 13181, 09/21/95, 9:30 AM - 10:00 AM  
LABORATORY NO. 370,482

5 Day BOD mg/l	7
Total Suspended Solids mg/l	32
Ammonia Nitrogen mg/l	0.43
Grease & Oil (Partition-Gravimetric) (Grab) mg/l	2
pH (Grab)	7.3

TECHNICAL LABORATORIES, INC.

*Martin H. Davis*

MARTIN H. DAVIS  
President

ibc

Bill

Company/Location Souwood Piedmont

Sample Location: OUTFALL 1#

Collector's Name: Jimmy L. Hudson

Sample Date: 9-21-95

Field Information: pH 7.6 Conductance \_\_\_\_\_ Temp. 23°

Wastewater \_\_\_\_\_ Soil \_\_\_\_\_ Sludge \_\_\_\_\_ Storm  
Groundwater ✓

Analysis Requested: 5-DAY BIOCHEMICAL OXYGEN DEMAND, TOTAL

SUSPENDED SOLIDS, AMMONIA AS NITROGEN, OIL & GREASE AND P.H.

LAB ID #

370.482

SWP Identification No. Time 10:15<sup>PM</sup> 9-21-95

SWP I.D. = 13181 (COMPOSITED)

Chain of Possession

[Signature]

Relinquished by

9/21/95 10:53<sup>PM</sup> 1111

Date/Time

Monty Welch

Received By

9/21/95 11:00 AM

Date/Time

Relinquished by

Date/Time 1111

Received By

Date/Time

Method of Shipment: \_\_\_\_\_

Container sealed before shipment: \_\_\_\_\_

Container sealed upon receipt: \_\_\_\_\_

Internal Temp. of Container: \_\_\_\_\_

Before shipping

On receipt

Bill

SOUTHERN WOOD PIEDMONT

NPDES STORM WATER SAMPLING FIELD FORM

SITE NAME:

OUTFALL LOCATION:

DATE:

SOUTHERN WOOD PIEDMONT  
OUTFALL #  
9/21/95

GENERAL RAINFALL EVENT CONDITIONS:

Rainfall Started:

Date:

9-20-95

Time:

11:00 PM

First Flow Thru Outfall Observed:

Date:

9-21-95

Time:

9:15 AM

Last Rainfall (> or = 0.1 inch)

Date:

9-16-95

Time:

12:00 AM

Hours Since Last Rain Event:

107 HRS

GRAB SAMPLE (To be collected during the first 30 minutes of discharge)

Sample Time: 9:25 AM

7.6 pH

23°

Temperature

Sampler/Tester's Signature:

J. L. Lushon

TIME WEIGHTED COMPOSITE SAMPLE (3 samples per hour taken a minimum of 15 minutes apart)

GRAB NO. HOUR

TIME

INITIALS

COMMENTS

1

①

9:30 AM

JLL

Good Flow in Ditch  
NO SHEEN ON WATER  
Color good

2

1

3

1

4

②

9:45 AM

JLL

5

2

6

2

7

③

10:00 AM

JLL

8

3

9

3

STORM EVENT DATA:

Temperature:

69°

Total Rainfall During Sampling:

0.2

Total Rainfall-inches:

0.9

Duration of Storm-hours:

13 HRS + 15 min 12:15 AM

Total Flow during Storm:

Samplers Signature

J. L. Lushon

P.O. Box 5447  
Spartanburg, S.C. 29304  
Phone: (864) 599-1070  
Fax: (864) 599-1087



## Southern Wood Piedmont Company

October 7, 1996

Tennessee Dept. of Environment and Conservation  
Division of Water Pollution Control  
Attn: Compliance and Enforcement  
6th Floor L & C Annex  
401 Church Street  
Nashville, TN 37243-1534

Re: TNR001832 Stormwater Monitoring Report

Dear Sir/Madame:

The attached Storm Water Monitoring Report for the 10/1/95 to 9/30/96 monitoring year is submitted for the SWP - Chattanooga NPDES Storm Water Permit number TNR001832.

Sincerely,

A handwritten signature in black ink, appearing to read 'W. P. Arrants', written over a horizontal line.

W. P. Arrants  
Environmental Compliance &  
Safety Manager

CC: T. M. Davis  
M. D. Pruett  
J. L. Hudson

3785bw



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
STORM WATER MONITORING REPORT  
MONITORING YEAR 10/1/95 TO 9/30/96

PAGE 1 OF 1

FACILITY NAME SOUTHERN WOOD FREMONT Co.  
ADDRESS 700 W. 3rd Street  
CITY Chattanooga COUNTY Hamilton

NPOES PERMIT NUMBER TNR001832  
CONTACT PERSON William P. Aarants  
PHONE NUMBER (864) 599-1070 ext 103

TOTAL NUMBER OF FACILITY OUTFALLS THAT CONVEY "STORM  
WATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY":

TOTAL NUMBER OF ABOVE OUTFALLS SAMPLED DURING THE MONITORING YEAR:

TOTAL NUMBER OF STORM EVENTS SAMPLED:

FIVE (5)  
ONE (1)  
ONE (1)

Note: Read instructions on back  
before completing this form.

PROVIDE THE FOLLOWING INFORMATION FOR EACH OUTFALL SAMPLED THIS YEAR:

- A.....DRAINAGE AREA OF OUTFALL  
B.....PERCENTAGE OF DRAINAGE AREA DEFINED AS INDUSTRIAL ACTIVITY  
C.....PERCENTAGE OF DRAINAGE AREA ON YOUR PROPERTY CONSISTING OF IMPERVIOUS SURFACES (CONCRETE, PAVEMENT, ROOF, PONDS)  
D.....PERCENTAGE OF DRAINAGE AREA ON YOUR PROPERTY CONSISTING OF VEGETATION (FOREST, LAWN, FIELD)  
E.....PERCENTAGE OF DRAINAGE AREA CONSISTING OF GRAVEL OR OTHER SURFACES  
F.....RAINFALL AMOUNT OF THE STORM EVENT SAMPLED; IF TWO OR MORE EVENTS WERE SAMPLED, REPORT THE HIGHER OR HIGHEST AMOUNT.

OUTFALL NO 5.0.1 A 20.5 ☐ SQ FEET ☒ ACRES  
B 1000% C 1.4 % D 77.0 % E 21.6 % F 1.9 INCHES

PARAMETER	QUALITY OR CONCENTRATION			REPORT LEVEL	UNITS	NO. OF SAMPLES	SAMPLE TYPE
	MINIMUM	AVERAGE	MAXIMUM				
BOD, 5-DAY (00310)	2	2	2	50	mg/l	1	COMP.
TOTAL S. SOLIDS (00530)	3	3	3	200	mg/l	1	COMP.
NITROGEN, AMMONIA (00610)	0.10	0.10	0.10	4	mg/l	1	COMP.
OIL AND GREASE (00550)	9	9	9	15	mg/l	1	GRAB
pH (00400)	8.4	8.4	8.4	4.0 - 9.0	stand.	1	GRAB

HAS A STORM WATER POLLUTION PREVENTION PLAN BEEN PREPARED FOR THIS FACILITY? ☒ YES ☐ NO

HAS THE PLAN BEEN SIGNED BY A PERSON WHO MEETS THE SIGNATORY REQUIREMENTS OF THE PERMIT? ☒ YES ☐ NO

HAS THE PLAN BEEN IMPLEMENTED? ☒ YES ☐ NO

HAVE YOUR STORM WATER OUTFALLS BEEN TESTED FOR UNPERMITTED, NON-STORM WATER DISCHARGES? ☒ YES ☐ NO

ARE THERE ANY UNPERMITTED, NON-STORM WATER DISCHARGES PRESENT? ☐ YES ☒ NO

IF SO, ATTACH RESULTS OF YOUR INVESTIGATION.

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tommy M. Davis  
TYPED OR PRINTED

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

DATE

10 6 96  
YEAR MONTH DAY

# TECHNICAL LABORATORIES, INC.

515 CHEROKEE BLVD.

MARTIN H. DAVIS  
President

CHATTANOOGA, TENNESSEE 37405

615/265-4533

October 11, 1995

Southern Wood Piedmont Company  
P.O. Box 1368  
Chattanooga, Tennessee 37401

Gentlemen:

Attention: Mr. Jimmy Hudson

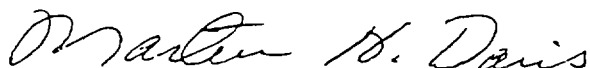
The information regarding the analysis of your storm water sample submitted October 03, 1995 (our Laboratory No. 370,818), is as follows:

	<u>ANALYSIS DATE</u>	<u>ANALYSIS TIME</u>	<u>EMPLOYEE NUMBER</u>	<u>METHOD NUMBER</u>
5 Day BOD	10/03/95	17:00	154	405.1
Total Suspended Solids	10/03/95	18:00	154	160.2
Ammonia Nitrogen	10/04/95	13:30	28	350.2
Grease & Oil (Partition- Gravimetric)	10/05/95	17:00	122	413.1
pH	10/03/95	16:30	154	150.1

The method numbers refer to EPA method numbers.

Sincerely,

TECHNICAL LABORATORIES, INC.



Martin H. Davis

wpf

# TECHNICAL LABORATORIES, INC.

515 CHEROKEE BLVD.

MARTIN H. DAVIS  
President

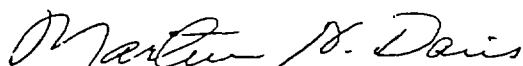
CHATTANOOGA, TENNESSEE 37405

615/265-4533

ACCOUNT NO. 2366-002 DATE OCTOBER 11, 1995  
RECEIVED FROM SOUTHERN WOOD PIEDMONT COMPANY, P. O. BOX 1368, CHATTANOOGA,  
MR. JIMMY HUDSON TENNESSEE 37401  
RECEIVED DATE 10/03/95  
MATERIAL STORM WATER  
MARKED SWP ID NO. 13201, 10/03/95, 2:11 PM  
LABORATORY NO. 370,818

5 Day BOD mg/l	2
Total Suspended Solids mg/l	3
Ammonia Nitrogen mg/l	0.10
Grease & Oil (Partition-Gravimetric) (Grab) mg/l	9
pH (Grab)	8.4

TECHNICAL LABORATORIES, INC.



MARTIN H. DAVIS  
President

ibc

## SOUTHERN WOOD PIEDMONT

## NPDES STORM WATER SAMPLING FIELD FORM

SITE NAME:

SOUTHERN WOOD PIEDMONT

OUTFALL LOCATION:

OUT FALL #1

DATE:

10/3/95

## GENERAL RAINFALL EVENT CONDITIONS:

Rainfall Started:

Date:

10/3/95

Time:

4:30 AM

First Flow Thru Outfall Observed:

Date:

10/3/95

Time:

1:05 PM

Last Rainfall (&gt; or = 0.1 inch)

Date:

9/22/95

Time:

7:30 AM

Hours Since Last Rain Event:

26 HRS

GRAB SAMPLE (To be collected during the first 30 minutes of discharge)

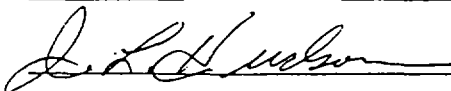
Sample Time: 1:12 PM7.8

pH

24°

Temperature

Sampler/Tester's Signature:



TIME WEIGHTED COMPOSITE SAMPLE (3 samples per hour taken a minimum of 15 minutes apart)

GRAB NO.	HOUR	TIME	INITIALS	COMMENTS
1	①	<u>1:15 PM</u>	<u>JLH</u>	<u>NO SHEEN, Good Color</u>
2	1			
3	1			
4	②	<u>1:30 PM</u>	<u>JLH</u>	<u>✓</u>
5	2			
6	2			
7	③	<u>1:45 PM</u>	<u>JLH</u>	<u>✓</u>
8	3			
9	3			

## STORM EVENT DATA:

Temperature:

70°

Total Rainfall During Sampling:

0.1

Total Rainfall-inches:

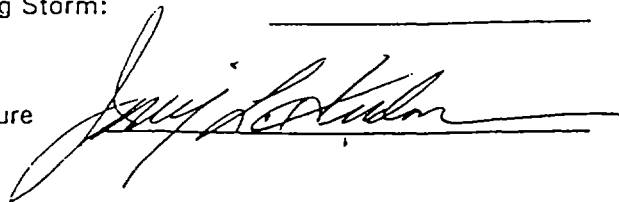
1.9

Duration of Storm-hours:

28 HRS + 10 min 8:10 AM

Total Flow during Storm:

Samplers Signature



Company/Location SOUTHERN WOOD PIEDMONT

Sample Location: OUT FALL # I

Collector's Name: JIMMY L. HUDSON

Sample Date: 10-3-95

Field Information: pH 7.8 Conductance \_\_\_\_\_ Temp. 24°

Wastewater \_\_\_\_\_ Soil \_\_\_\_\_ Sludge \_\_\_\_\_ <sup>Storm</sup> Groundwater ☒

Analysis Requested: 5-DAY BIOCHEMICAL OXYGEN DEMAND, TOTAL

SUSPENDED SOLIDS, AMMONIA AS NITROGEN, OIL & GREASE AND P.H.

LAB ID # \_\_\_\_\_

SWP Identification No. \_\_\_\_\_ Time 2:11 PM

S.W.P. I.D. NUMBER = 13201

(COMPOSITED)

Chain of Possession

J. Hudson

Relinquished by

10/3/95 2:30 PM

Date/Time

Monty Webb

Received By

10/3/95 15:15

Date/Time

Relinquished by

Date/Time

Received By

Date/Time

Method of Shipment: \_\_\_\_\_

Container sealed before shipment: \_\_\_\_\_

Container sealed upon receipt: \_\_\_\_\_

Internal Temp. of Container: \_\_\_\_\_

Before shipping

On receipt

**STORMWATER RUNOFF VISUAL MONITOR LOG**  
**SOUTHERN WOOD PIEDMONT COMPANY**  
**CHATTANOOGA, TN**

INSPECTOR: <u>Jimmy L. Hudson</u>	DATE: <u>10/3/95</u>				
TITLE:	SIGNATURE: <u>[Signature]</u>				
	STORMWATER OUTFALL NUMBER				
	1	2	3	4	5
TIME OF EVALUATION	<u>1:15</u>	<u>1:20</u>	<u>1:35</u>	<u>1:38</u>	<u>1:41</u>
1. DOES THE STORMWATER RUNOFF EXHIBIT:					
A. ANY COLOR?	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>
B. ANY OIL SHEEN?	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>
C. ANY SUSPENDED SOLID MATERIAL?	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>
D. ANY FLOATING MATERIAL?	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>
2. IS ANY EROSION OCCURRING AROUND THE OUTFALL?	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>
3. IS THERE ANY OTHER UNUSUAL OR NOTABLE CHARACTERISTIC OF THE RUNOFF?	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>
EXPLAIN ANY "YES" ANSWERS NOTED ABOVE:					

A visual inspection of stormwater runoff will be conducted at each outfall during a site stormwater sampling event. Problems with runoff quality which are observed during the inspection will be corrected. Corrective measures taken to improve runoff quality will be documented and stored in the site's stormwater pollution prevention plan.

FORM DATE  
7/7/95



## Southern Wood Piedmont Company

October 8, 1997

Tennessee Department of Environment & Conservation  
Division of Water Pollution Control  
Attn: Compliance and Enforcement  
6th Floor L&C Annex  
401 Church Street  
Nashville, TN 37243-1534

Re: TNR001832 Stormwater Monitoring Report

Dear Sir/Madame

The attached Storm Water Monitoring Report for the 10/1/96 to 9/30/97 monitoring year is submitted for the SWP - Chattanooga NPDES Storm Water Permit number TNR001832.

Please contact me at 864-599-1070, extension 103, if you have questions or comments.

Sincerely,

A handwritten signature in black ink, appearing to read 'W. P. Arrants'.

W. P. Arrants  
Environmental Compliance  
and Safety Manager

CC: T. M. Davis w/report only  
M. D. Pruett w/report only  
J. L. Hudson



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
STORM WATER MONITORING REPORT  
MONITORING YEAR 10/1/96 TO 9/30/97

PAGE 1 OF 1

FACILITY NAME SOUTHERN WOOD PIEDMONT CO.  
ADDRESS 400 W 33<sup>RD</sup> STREET  
CITY CHATTANOOGA COUNTY HAMILTON

NPDES PERMIT NUMBER TNR 001832  
CONTACT PERSON WILLIAM P. ARANTES  
PHONE NUMBER (864) 599-1070 ext. 103

TOTAL NUMBER OF FACILITY OUTFALLS THAT CONVEY "STORM  
WATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY":

TOTAL NUMBER OF ABOVE OUTFALLS SAMPLED DURING THE MONITORING YEAR:

TOTAL NUMBER OF STORM EVENTS SAMPLED:

FIVE (5)  
ONE (1)  
ONE (1)

Note: Read instructions on back  
before completing this form.

PROVIDE THE FOLLOWING INFORMATION FOR EACH OUTFALL SAMPLED THIS YEAR:

- A.....DRAINAGE AREA OF OUTFALL  
B.....PERCENTAGE OF DRAINAGE AREA DEFINED AS INDUSTRIAL ACTIVITY  
C.....PERCENTAGE OF DRAINAGE AREA ON YOUR PROPERTY CONSISTING OF IMPERVIOUS SURFACES (CONCRETE, PAVEMENT, ROOF, PONDS)  
D.....PERCENTAGE OF DRAINAGE AREA ON YOUR PROPERTY CONSISTING OF VEGETATION (FOREST, LAWN, FIELD)  
E.....PERCENTAGE OF DRAINAGE AREA CONSISTING OF GRAVEL OR OTHER SURFACES  
F.....RAINFALL AMOUNT OF THE STORM EVENT SAMPLED; IF TWO OR MORE EVENTS WERE SAMPLED, REPORT THE HIGHER OR HIGHEST AMOUNT.

OUTFALL NO. 501 A 20.5 ☐ SQ FEET ☒ ACRES  
B 100 % C 1.4 % D 77.0 % E 23.0 % F 0.8 INCHES

PARAMETER	QUALITY OR CONCENTRATION			REPORT LEVEL	UNITS	NO. OF SAMPLES	SAMPLE TYPE
	MINIMUM	AVERAGE	MAXIMUM				
BOD, 5-DAY (00310)	<u>2</u>	<u>2</u>	<u>2</u>	50	mg/l	<u>1</u>	COMP.
TOTAL S. SOLIDS (00530)	<u>7</u>	<u>7</u>	<u>7</u>	200	mg/l	<u>1</u>	COMP.
NITROGEN, AMMONIA (00610)	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	4	mg/l	<u>1</u>	COMP.
OIL AND GREASE (00550)	<u>1</u>	<u>1</u>	<u>1</u>	15	mg/l	<u>1</u>	GRAB
pH (00400)	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	4.0 - 9.0	stand.	<u>1</u>	GRAB

HAS A STORM WATER POLLUTION PREVENTION PLAN BEEN PREPARED FOR THIS FACILITY?

☒ YES ☐ NO

HAS THE PLAN BEEN SIGNED BY A PERSON WHO MEETS THE SIGNATORY REQUIREMENTS OF THE PERMIT?

☒ YES ☐ NO

HAS THE PLAN BEEN IMPLEMENTED?

☒ YES ☐ NO

HAVE YOUR STORM WATER OUTFALLS BEEN TESTED FOR UNPERMITTED, NON-STORM WATER DISCHARGES?

☒ YES ☐ NO

ARE THERE ANY UNPERMITTED, NON-STORM WATER DISCHARGES PRESENT?

☐ YES ☒ NO

IF SO, ATTACH RESULTS OF YOUR INVESTIGATION.

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT.

TITLE PRINCIPAL EXECUTIVE OFFICER <u>J.M. Davis</u> <u>Mgr. Env. Affairs</u>	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT <u>[Signature]</u>	DATE <u>10</u> <u>8</u> <u>97</u>
TYPED OR PRINTED		YEAR MONTH DAY

## SOUTHERN WOOD PIEDMONT

## NPDES STORM WATER SAMPLING FIELD FORM

SITE NAME:

CHATTANOOGA TN

OUTFALL LOCATION:

OUTFALL #1

DATE:

12-12-96

## GENERAL RAINFALL EVENT CONDITIONS:

Rainfall Started:

Date:

12-12-96

Time:

6:00 AM

First Flow Thru Outfall Observed:

Date:

12-12-96

Time:

10:15 AM

Last Rainfall (&gt; or = 0.1 inch)

Date:

12-7-96

Time:

11:00 AM

Hours Since Last Rain Event:

115 HRS

GRAB SAMPLE (To be collected during the first 30 minutes of discharge)

Sample Time: 10:23 AM7.6

pH

16°

Temperature

Sampler/Tester's Signature:

James L. Hudson

TIME WEIGHTED COMPOSITE SAMPLE (3 samples per hour taken a minimum of 15 minutes apart)

GRAB NO.	HOUR	TIME	INITIALS	COMMENTS
1	①	<u>10:30 AM</u>	<u>JRH</u>	<u>Good Color, No</u>
2	1			<u>SMELL</u>
3	1			
4	②	<u>10:45 AM</u>	<u>JRH</u>	
5	2			
6	2			
7	③	<u>11:00 AM</u>	<u>JRH</u>	
8	3			
9	3			

## STORM EVENT DATA:

Temperature:

60°

Total Rainfall During Sampling:

0.1

Total Rainfall-inches:

0.8

Duration of Storm-hours:

11 HRS

Total Flow during Storm:

Samplers Signature

James L. Hudson

**STORMWATER RUNOFF VISUAL MONITOR LOG**  
**SOUTHERN WOOD PIEDMONT COMPANY**  
**CHATTANOOGA, TN**

INSPECTOR: <i>Jimmy L. Hudson</i>	DATE: <i>12-12-96</i>				
TITLE:	SIGNATURE: <i>J. L. Hudson</i>				
	STORMWATER OUTFALL NUMBER				
	1	2	3	4	5
TIME OF EVALUATION	<i>10:30</i>	<i>10:36</i>	<i>10:40</i>	<i>10:49</i>	<i>10:54</i>
1. DOES THE STORMWATER RUNOFF EXHIBIT:					
A. ANY COLOR?	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>
B. ANY OIL SHEEN?	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>
C. ANY SUSPENDED SOLID MATERIAL?	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>
D. ANY FLOATING MATERIAL?	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>
2. IS ANY EROSION OCCURRING AROUND THE OUTFALL?	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>
3. IS THERE ANY OTHER UNUSUAL OR NOTABLE CHARACTERISTIC OF THE RUNOFF?	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>
EXPLAIN ANY "YES" ANSWERS NOTED ABOVE:					

A visual inspection of stormwater runoff will be conducted at each outfall during a site stormwater sampling event. Problems with runoff quality which are observed during the inspection will be corrected. Corrective measures taken to improve runoff quality will be documented and stored in the site's stormwater pollution prevention plan.

FORM DATE  
7/7/95

# TECHNICAL LABORATORIES, INC.

515 CHEROKEE BLVD.

CHATTANOOGA, TENNESSEE 37405

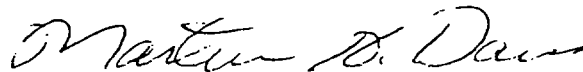
423/265-4533

MARTIN H. DAVIS  
President

ACCOUNT NO. 2366-002 DATE DECEMBER 18, 1996  
RECEIVED FROM SOUTHERN WOOD PIEDMONT COMPANY, P. O. BOX 1368, CHATTANOOGA,  
MR. JIMMY HUDSON TENNESSEE 37401  
RECEIVED DATE 12/12/96  
MATERIAL STORM WATER  
MARKED SWP ID NO. 14114, 12/12/96, 10:30 AM - 11:00 AM  
LABORATORY NO. 383,762

5 Day BOD mg/l	2
Total Suspended Solids mg/l	7
Ammonia Nitrogen mg/l	1.0
Grease & Oil (Partition-Gravimetric) (Grab) mg/l	1
pH (Grab)	8.1

TECHNICAL LABORATORIES, INC.



MARTIN H. DAVIS  
President

ibc

# TECHNICAL LABORATORIES, INC.

515 CHEROKEE BLVD.

MARTIN H. DAVIS  
President

CHATTANOOGA, TENNESSEE 37405

423/265-4533

December 18, 1996

Southern Wood Piedmont Company  
P.O. Box 1368  
Chattanooga, Tennessee 37401

Gentlemen:

Attention: Mr. Jimmy Hudson

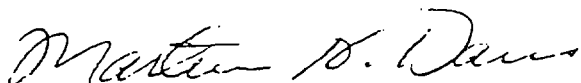
The information regarding the analysis of your storm water sample submitted December 12, 1996 (our Laboratory No. 383,762) is as follows:

	<u>ANALYSIS DATE</u>	<u>ANALYSIS TIME</u>	<u>EMPLOYEE NUMBER</u>	<u>METHOD NUMBER</u>
5 Day BOD	12/12/96	17:00	154	405.1
Total Suspended Solids	12/12/96	15:00	154	160.2
Ammonia Nitrogen	12/13/96	13:00	28	350.2
Grease & Oil (Partition- Gravimetric)	12/12/96	16:45	130	413.1
ph	12/12/96	16:00	154	150.1

The method numbers refer to EPA method numbers.

Sincerely,

TECHNICAL LABORATORIES, INC.



Martin H. Davis

wpf

Company/Location SOUTHERN WOOD PIEDMONT

Sample Location: OUT Fall #1

Collector's Name: JIMMY L. HUDSON

Sample Date: 12-12-96

Field Information: pH 7.6 Conductance \_\_\_\_\_ Temp. 16°

Wastewater \_\_\_\_\_ Soil \_\_\_\_\_ Sludge \_\_\_\_\_ Storm  
Groundwater ✓

Analysis Requested: 5-DAY BIOCHEMICAL OXYGEN DEMAND, TOTAL  
SUSPENDED SOLIDS, AMMONIA AS NITROGEN, OIL & GREASE AND  
P.H.

LAB ID # \_\_\_\_\_

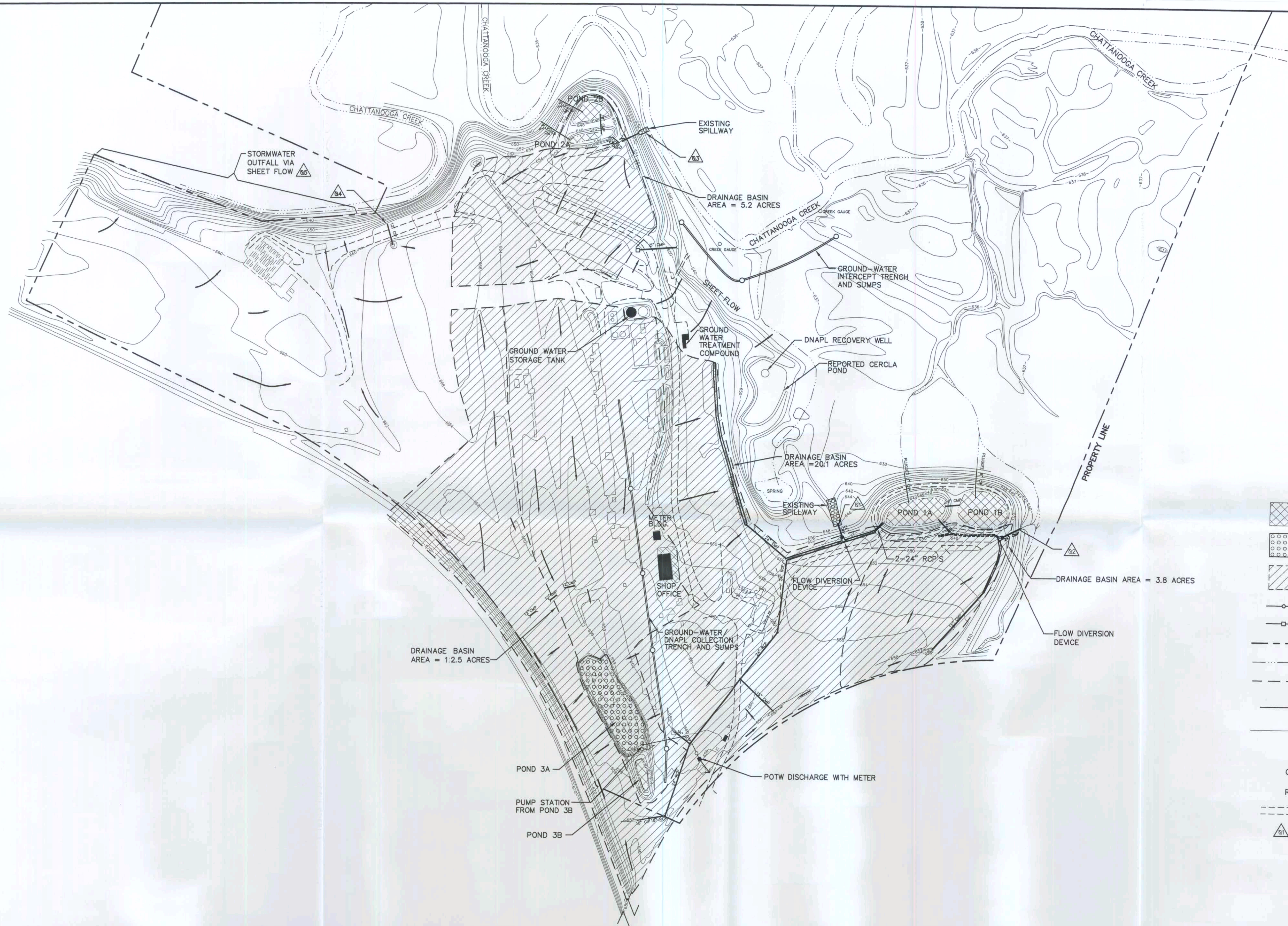
SWP Identification No. \_\_\_\_\_ Time 11:30 AM

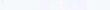
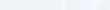
SWP I.D. = 14114 (COMPOSITED)


Chain of Possession

<u>[Signature]</u>	<u>12/12/96 11:30 AM</u>	<u>[Signature]</u>	<u>12/12/96 11:30 AM</u>
Relinquished by	Date/Time	Received By	Date/Time
	<u>1111</u>		
Relinquished by	Date/Time	Received By	Date/Time

Method of Shipment: \_\_\_\_\_ Container sealed before shipment: \_\_\_\_\_  
Internal Temp. of Container: \_\_\_\_\_ Container sealed upon receipt: \_\_\_\_\_  
Before shipping On receipt




	EXISTING STORMWATER DETENTION/ AERATION POND
	EXISTING CLOSED HAZARDOUS WASTE MANAGEMENT UNIT
	EXISTING DRAINAGE AREA
	MANHOLE
	DROP INLET
	PROPERTY BOUNDARY
	DITCH CENTERLINE OR EDGE OF WATER
	DRAINAGE BOUNDARY
	RUN-OFF FLOW DIRECTION
	EXISTING CONTOUR
CIP	CAST IRON PIPE
CMP	CORRUGATED METAL PIPE
RCP	REINFORCED CONCRETE PIPE
	GRAVEL ROAD
	STORMWATER DISCHARGE POINT

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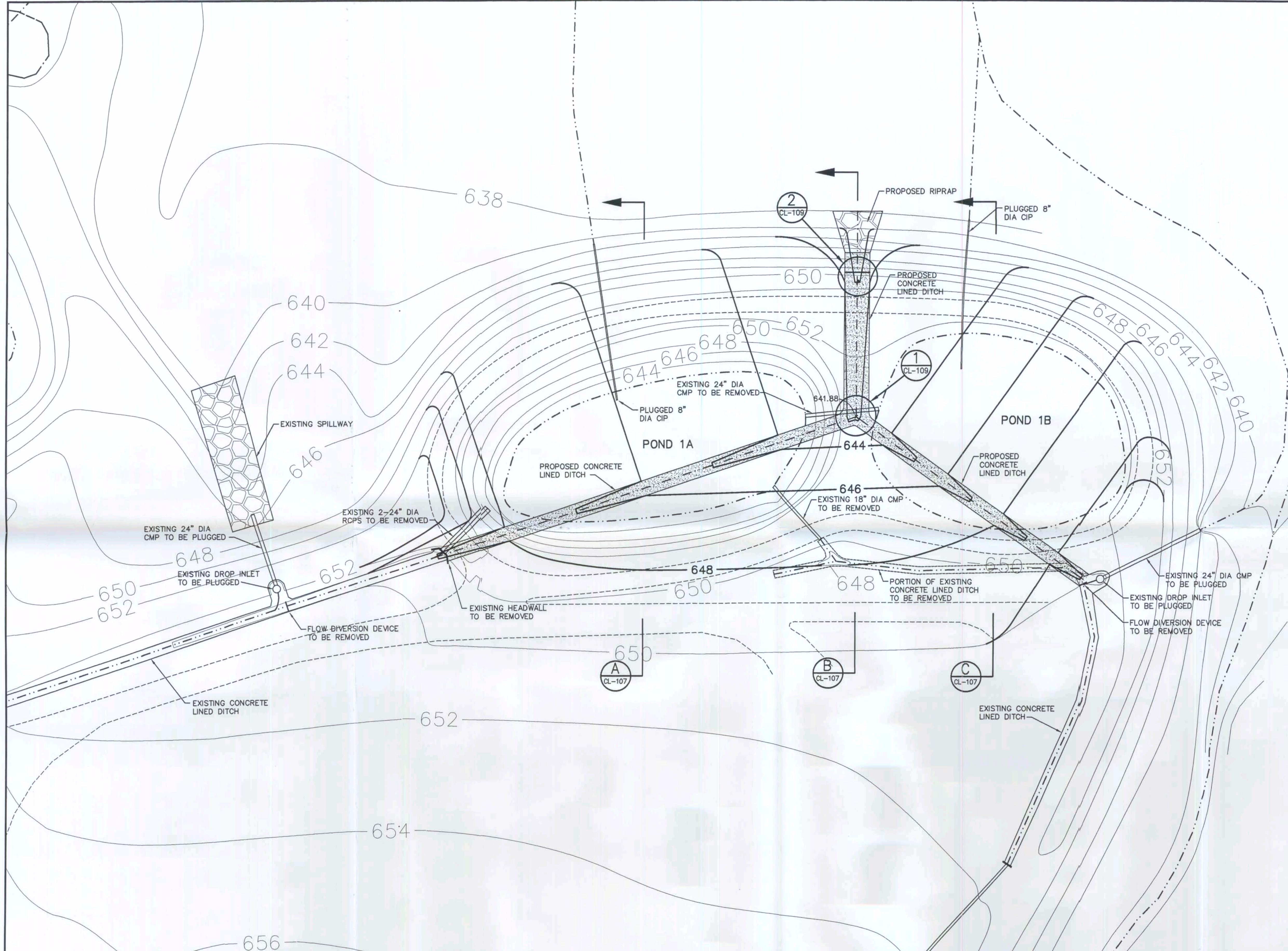
EXISTING SITE DRAINAGE MAP  
REVISED MAY 24, 2001

CONTRACT		
30300-9-0500		
DWG. NO.	REV	PAGE NO
C1-101	0	1

[illegible]

**LAW**  
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

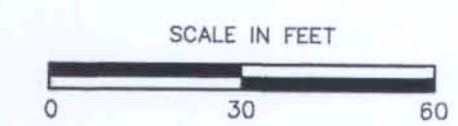




LEGEND

- DITCH CENTERLINE OR EDGE OF WATER
- EXISTING CONTOUR
- PROPOSED CONTOUR
- CIP CAST IRON PIPE
- CMP CORRUGATED METAL PIPE
- RCP REINFORCED CONCRETE PIPE
- EXISTING GRAVEL ROAD
- [RIPRAP SYMBOL] RIPRAP
- [CONCRETE LINED DITCH SYMBOL] PROPOSED CONCRETE LINED DITCH

NOTE: DESIGN ELEVATION FOR THE BOTTOM OF PONDS 1A AND 1B WAS 640 ACCORDING TO THE 1976 DRAWINGS PREPARED BY BETTS ENGINEERING CO., INC.

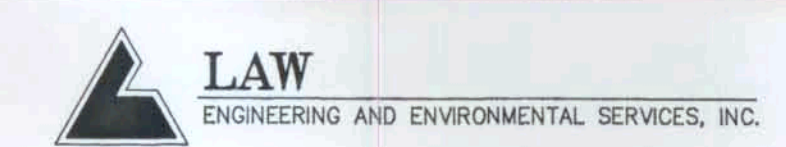


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SCALE	
AS SHOWN	
CONTRACT	
30300-9-0500	
DWG. NO.	REV PAGE NO
CL-103	0 3

SOUTHERN WOOD PIEDMONT CO.

CHATTANOOGA, TENNESSEE



STORMWATER RETENTION/  
TREATMENT PONDS 1A AND 1B  
GRADING PLAN

DESIGNED  
S.H. WOLD  
DRAWN  
C.K. BUDSOCK  
CHECKED  
S.E. BLEVINS  
IN CHARGE  
S.B. HARVEY  
DATE 19 MARCH 99

REV	DATE	BY	SUB APP	DESCRIPTION	REV	DATE	BY	SUB APP	DESCRIPTION

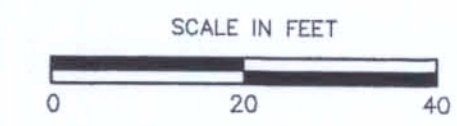
XREF: CADD FILE: SWP/CHAT/CLOSURE/PL-1A1B  
PLOT DATE: 3/19/99



LEGEND

- DITCH CENTERLINE OR EDGE OF WATER
- EXISTING CONTOUR
- PROPOSED CONTOUR
- CIP CAST IRON PIPE
- CMP CORRUGATED METAL PIPE
- RCP REINFORCED CONCRETE PIPE
- RIPRAP
- PROPOSED CONCRETE LINED DITCH

NOTE: DESIGN ELEVATION FOR THE BOTTOM OF PONDS 2A AND 2B WAS 640 ACCORDING TO THE 1976 DRAWINGS PREPARED BY BETTS ENGINEERING CO., INC.



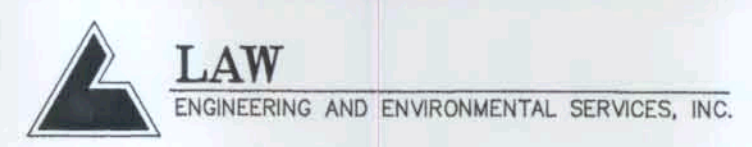
© COPYRIGHT 1999 LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

SCALE	
AS SHOWN	
CONTRACT	
30300-9-0500	
DWG. NO.	REV PAGE NO
CL-104	0 4

REV	DATE	BY	SUB APP	DESCRIPTION	REV	DATE	BY	SUB APP	DESCRIPTION

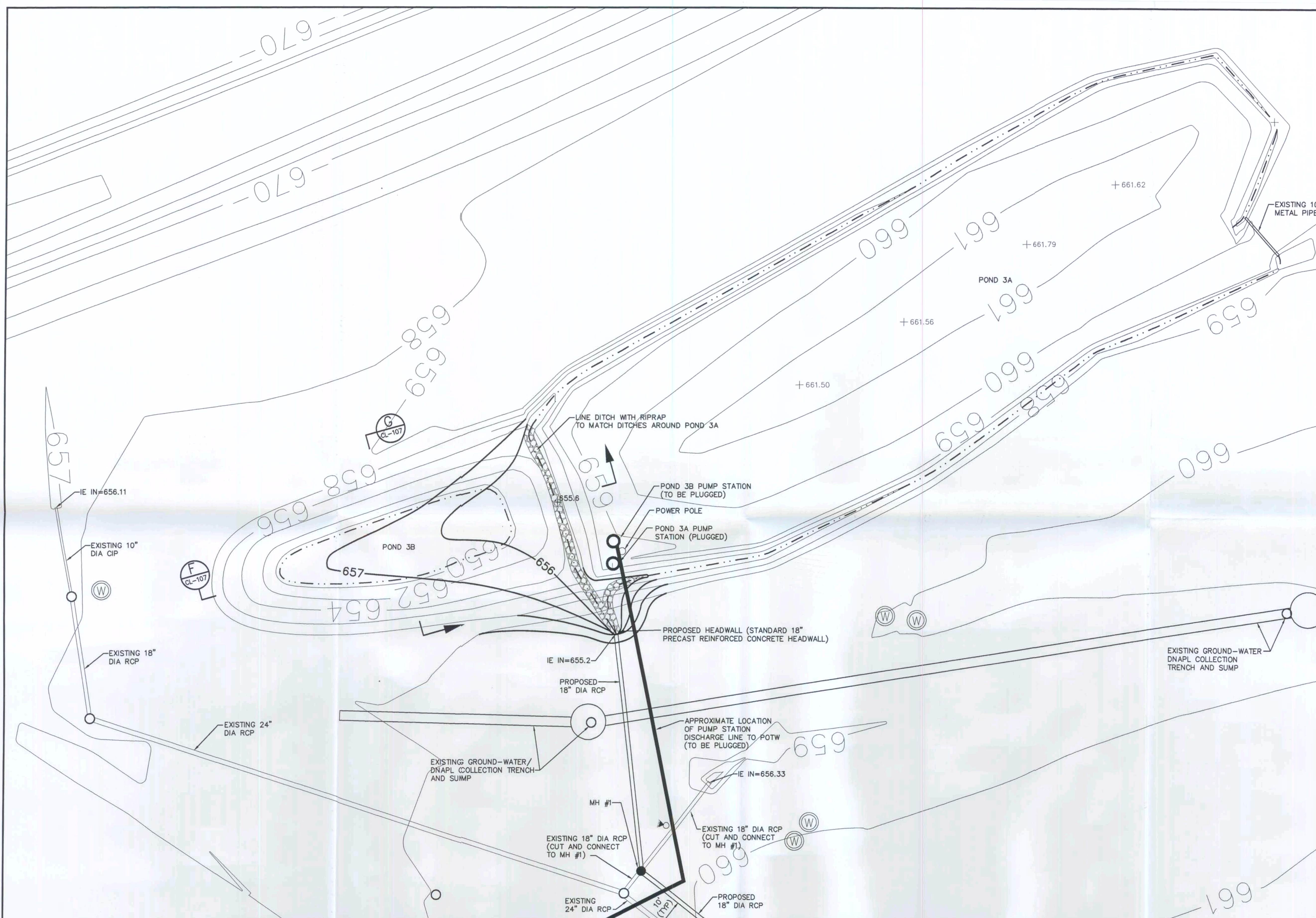
DESIGNED	R.T. DEASON
DRAWN	C.K. BUDSOCK
CHECKED	S.E. BLEVINS
IN CHARGE	S.B. HARVEY
DATE	19 MARCH 99

SOUTHERN WOOD PIEDMONT CO.  
CHATTANOOGA, TENNESSEE



STORMWATER RETENTION/  
TREATMENT PONDS 2A AND 2B  
GRADING PLAN

XREF: CADD FILE: SWP/CHAT/CLOSURE/PL-2A2B  
PLOT DATE: 3/19/99



	DITCH CENTERLINE OR EDGE OF WATER
	EXISTING CONTOUR
	PROPOSED CONTOUR
	PROPOSED RIPRAP
CIP	CAST IRON PIPE
CMP	CORRUGATED METAL PIPE
RCP	REINFORCED CONCRETE PIPE
	EXISTING MANHOLE/SUMP
	PROPOSED MANHOLE
IE	INVERT ELEVATION
	LIGHT POLE
	GROUND-WATER WELL

SCALE IN FEET

0 20 40

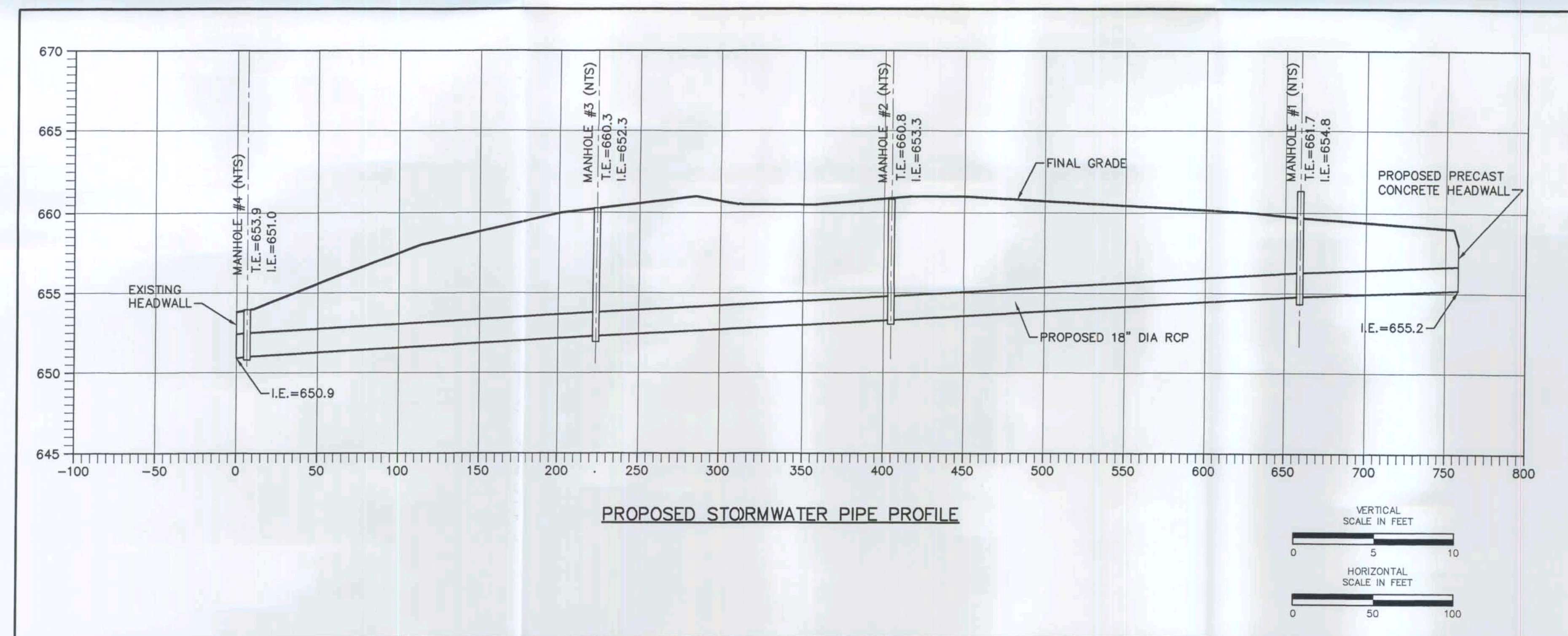
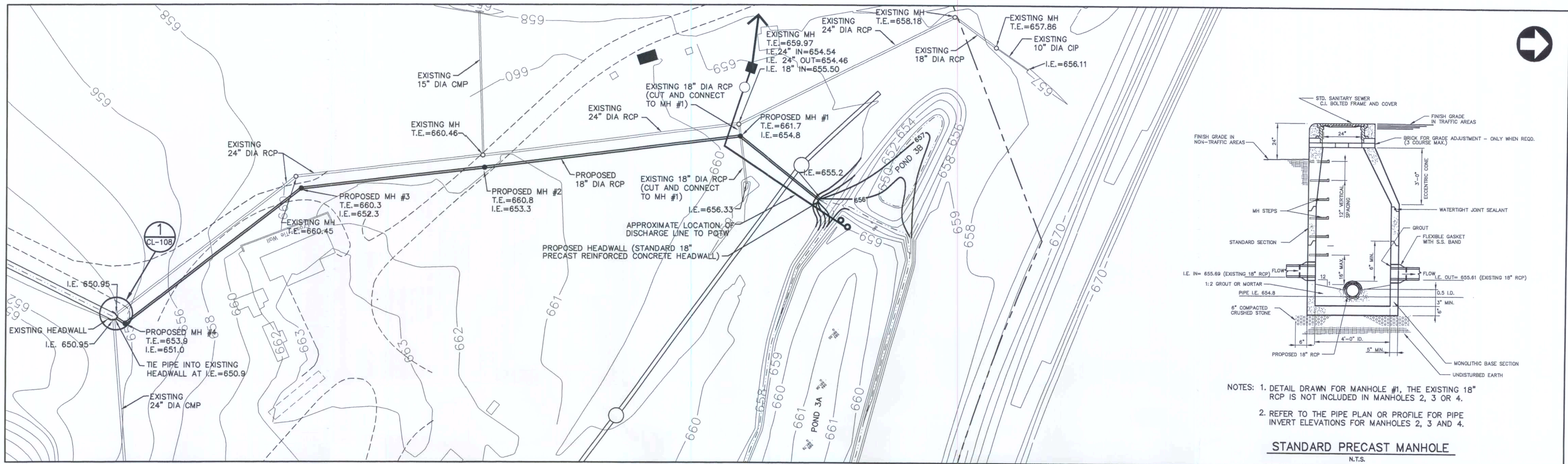
DWG. NO.	REV	PAGE NO.
CL-105	0	5

**LAW**  
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

DESIGNED	S.H. WOLD
DRAWN	C.K. BUDSOCK
CHECKED	S.E. BLEVINS
IN CHARGE	S.B. HARVEY
DATE	19 MARCH 99

[illegible]

KREF: SWP/CHAT/CLOSURE/PL-3B  
CADD FILE: 3/19/99  
PLOT DATE:



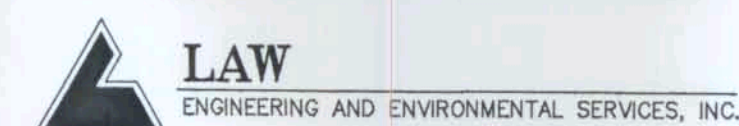
**LEGEND**

MH	MANHOLE
MIN.	MINIMUM
MAX.	MAXIMUM
T.E.	TOP ELEVATION
B.E.	BOTTOM ELEVATION
I.E.	INVERT ELEVATION
I.D.	INNER DIAMETER
C.I.	CAST IRON
RCP	REINFORCED CONCRETE PIPE
CIP	CAST IRON PIPE
CMP	CORRUGATED METAL PIPE
S.S.	STAINLESS STEEL
NTS	NOT TO SCALE

XREF: CADD FILE: SWP/CHAT/CLOSURE/PRO1  
PLOT DATE: 3/19/99

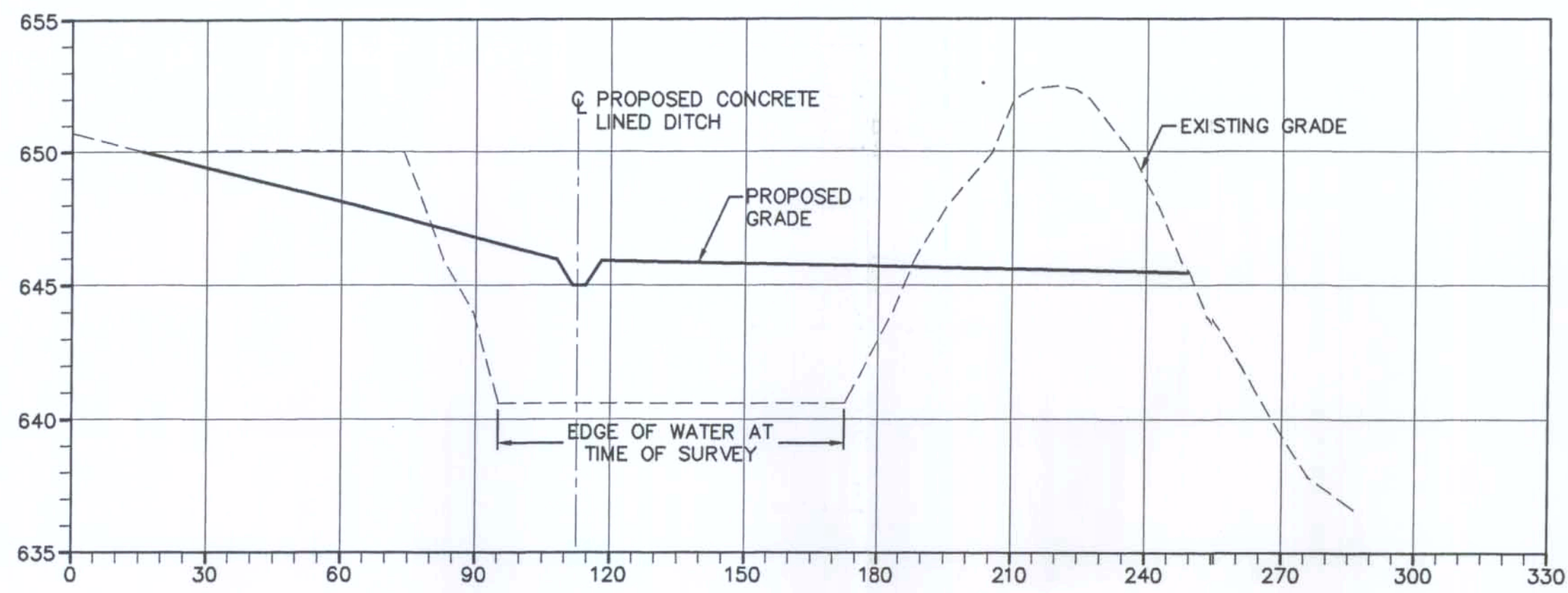
REV	DATE	BY	SUBAPP	DESCRIPTION	REV	DATE	BY	SUBAPP	DESCRIPTION	DATE
										19 MARCH 99

**SOUTHERN WOOD PIEDMONT CO.**  
CHATTANOOGA, TENNESSEE



**STORMWATER PIPE  
PLAN & PROFILE**

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SCALE AS SHOWN	
CONTRACT 30300-9-0500	
DWG. NO. CL-106	REV PAGE NO 0 6

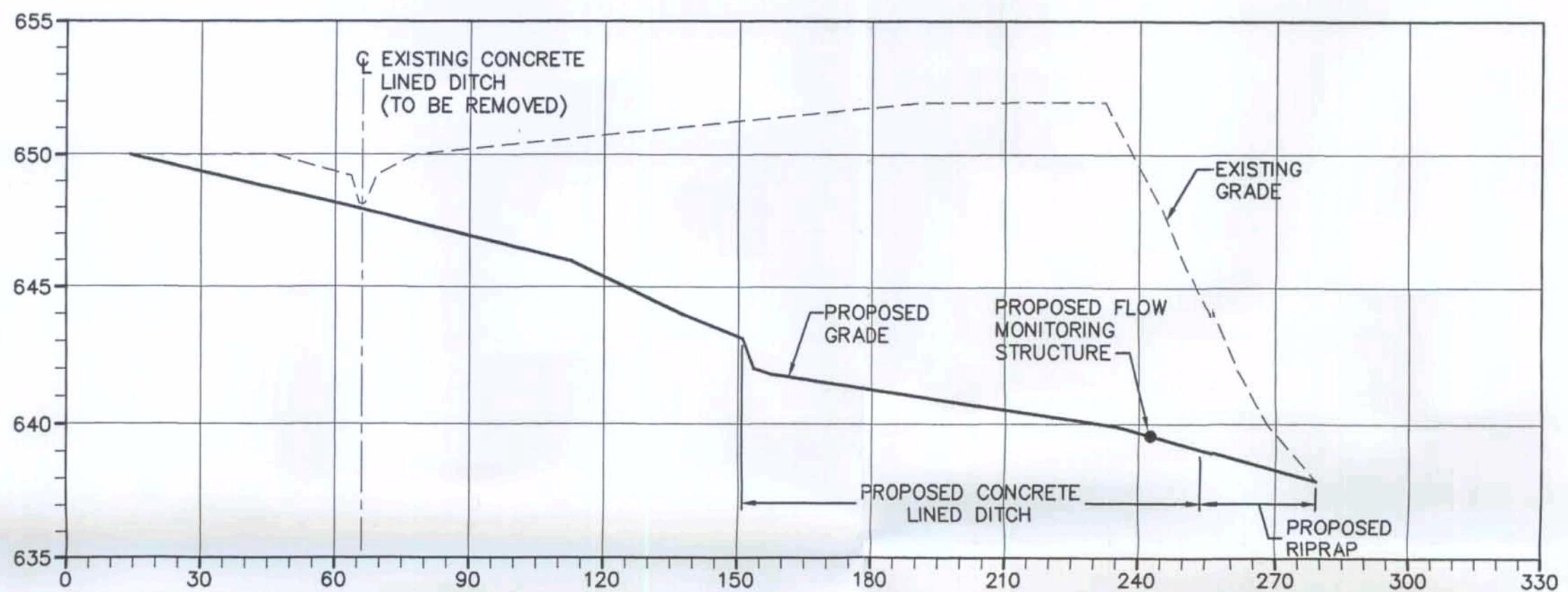


POND 1A CROSS SECTION

SECTION A

SCALE: HORIZONTAL: 1"=30'-0"  
VERTICAL: 1"=5'-0"

CL-107 CL-103

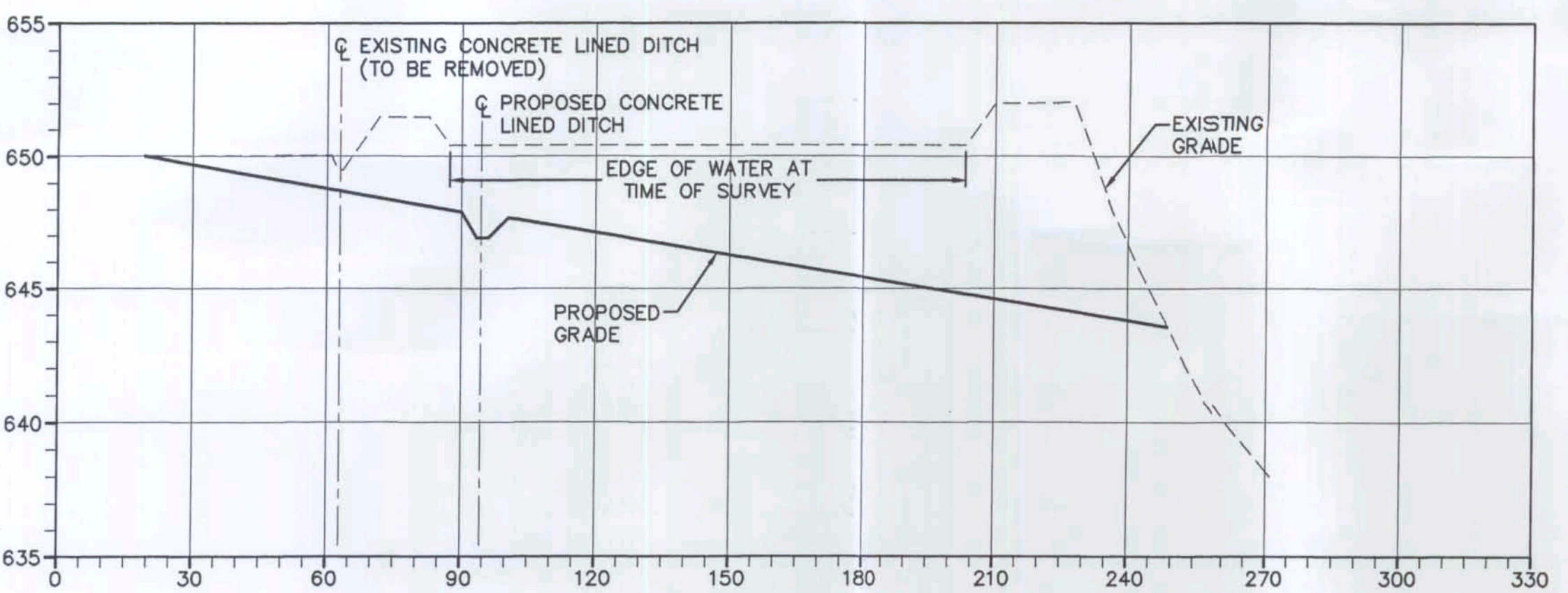


PONDS 1A AND 1B CROSS SECTION

SECTION B

SCALE: HORIZONTAL: 1"=30'-0"  
VERTICAL: 1"=5'-0"

CL-107 CL-103

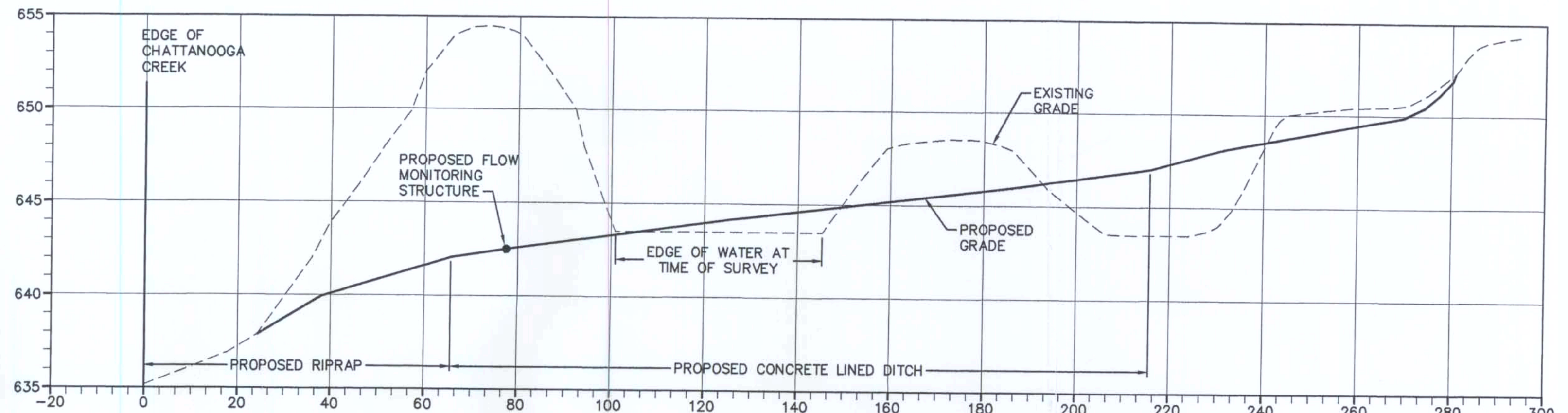


POND 1B CROSS SECTION

SECTION C

SCALE: HORIZONTAL: 1"=30'-0"  
VERTICAL: 1"=5'-0"

CL-107 CL-103

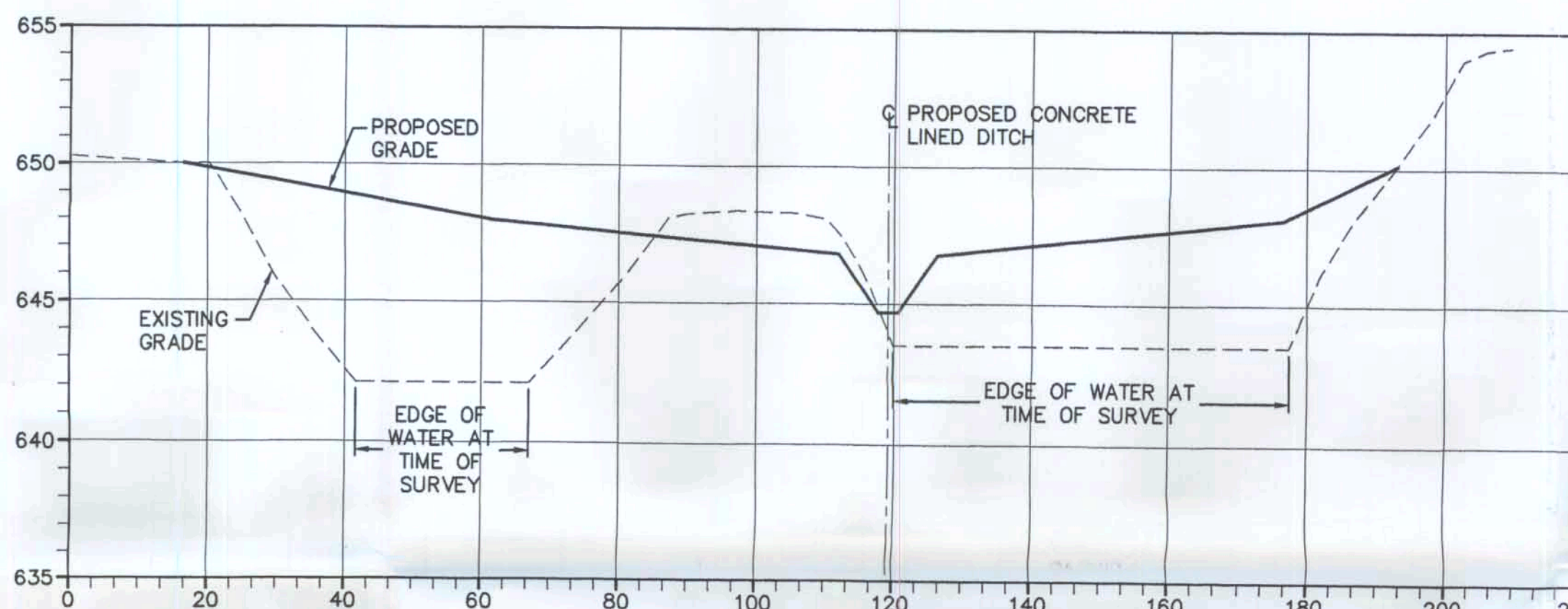


PONDS 2A AND 2B CROSS SECTION (1 OF 2)

SECTION D

SCALE: HORIZONTAL: 1"=20'-0"  
VERTICAL: 1"=5'-0"

CL-107 CL-104

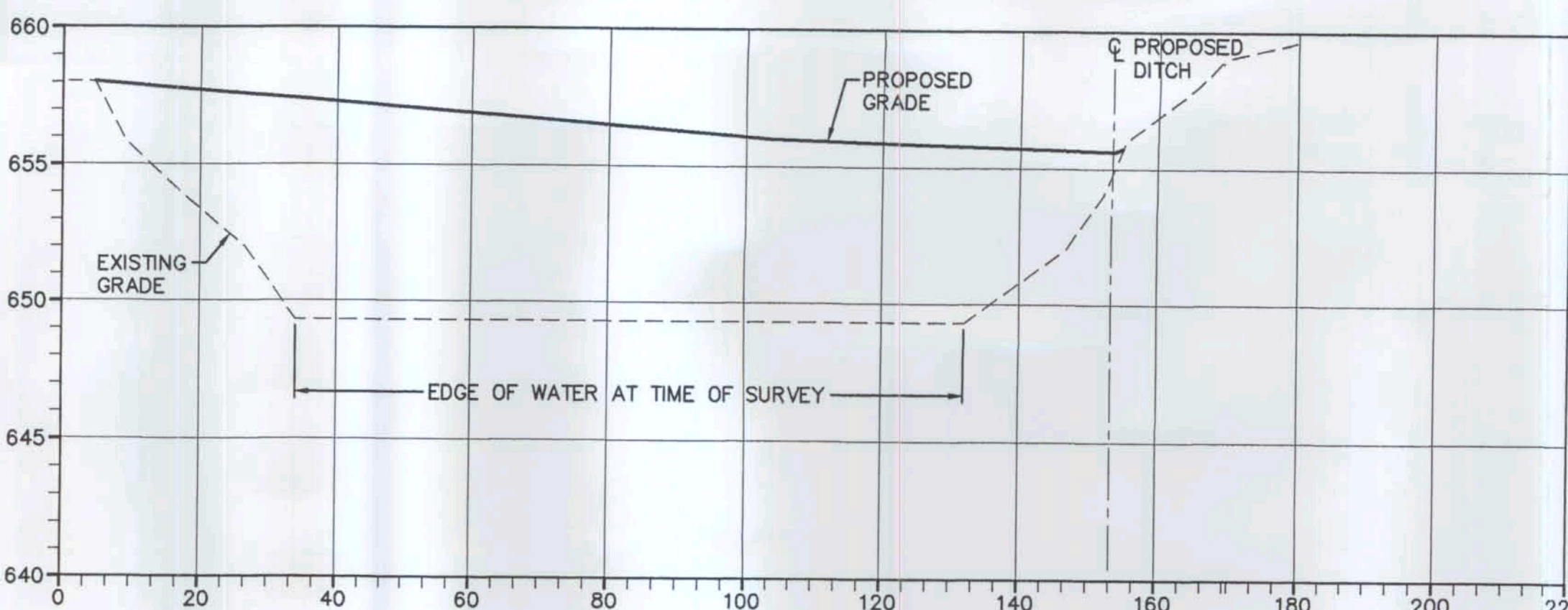


PONDS 2A AND 2B CROSS SECTION (2 OF 2)

SECTION E

SCALE: HORIZONTAL: 1"=20'-0"  
VERTICAL: 1"=5'-0"

CL-107 CL-104

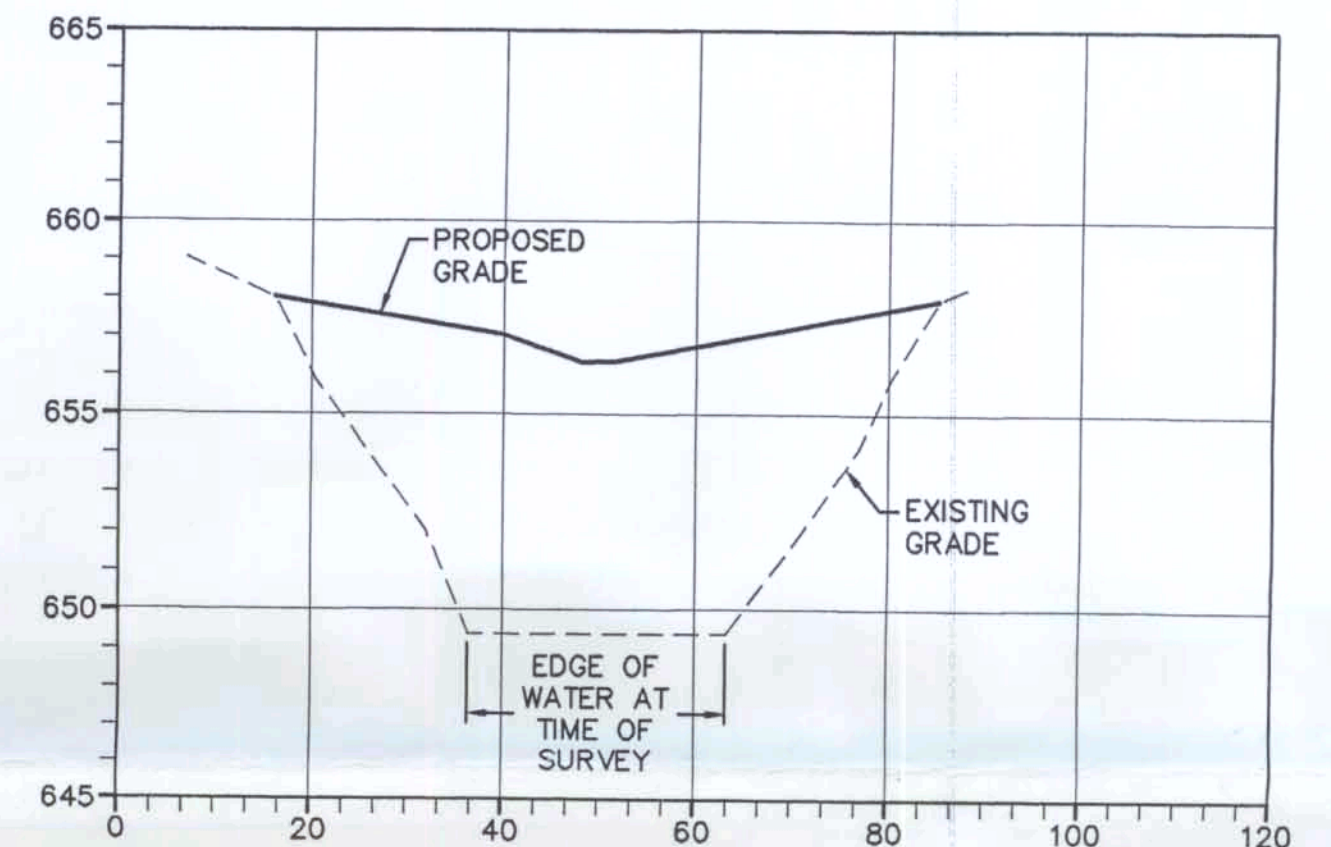


POND 3B CROSS SECTION (1 OF 2)

SECTION F

SCALE: HORIZONTAL: 1"=20'-0"  
VERTICAL: 1"=5'-0"

CL-107 CL-105



POND 3B CROSS SECTION (2 OF 2)

SECTION G

SCALE: HORIZONTAL: 1"=20'-0"  
VERTICAL: 1"=5'-0"

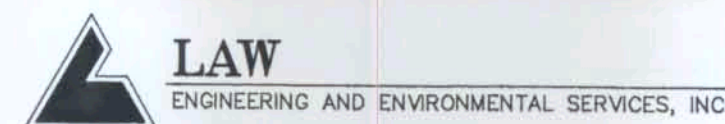
CL-107 CL-105

XREF: CADD FILE: SWP/CHAT/CLOSURE/XSECTS  
PLOT DATE: 3/19/99

REV	DATE	BY	SUBAPP	DESCRIPTION	REV	DATE	BY	SUBAPP	DESCRIPTION

DESIGNED  
S.H. WOLD  
DRAWN  
C.K. BUDSOCK  
CHECKED  
S.E. BLEVINS  
IN CHARGE  
S.B. HARVEY  
DATE 19 MARCH 99

SOUTHERN WOOD PIEDMONT CO.  
CHATTANOOGA, TENNESSEE



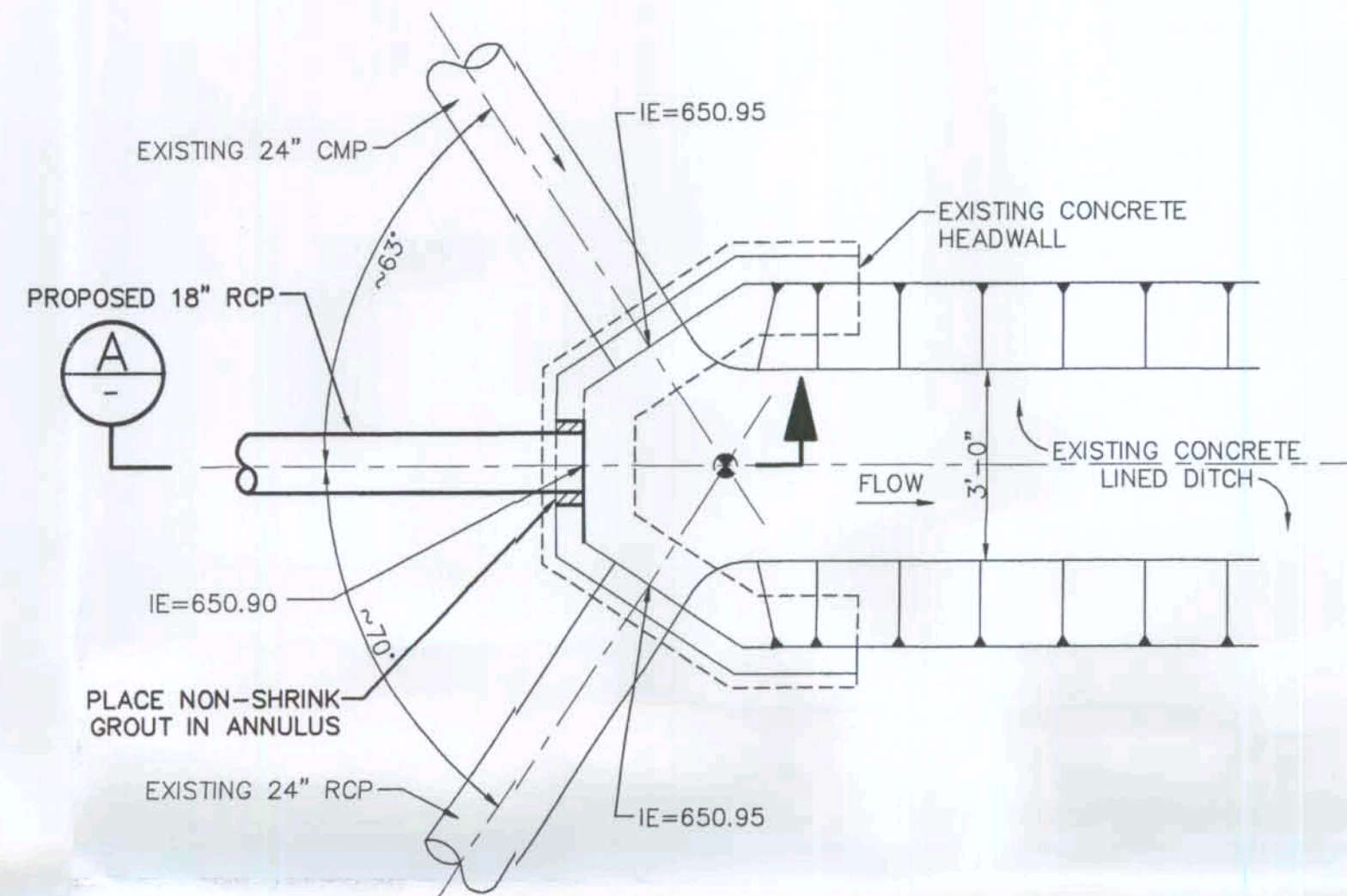
CROSS SECTIONS

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SCALE  
AS SHOWN

CONTRACT  
30300-9-0500

DWG. NO. CL-107 REV PAGE NO. 0 7



- NOTES: 1. ALL DIMENSIONS AND ANGLES SHOWN ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY FOR CONSTRUCTION.
2. CUT HOLE IN EXISTING CONCRETE HEADWALL AT INDICATED LOCATION FOR INSTALLATION OF PROPOSED 18" RCP. CUT AND REMOVE CONCRETE AND REINFORCING AS REQUIRED. INSTALL NEW PIPE AT REQUIRED ALIGNMENT AND ELEVATION.

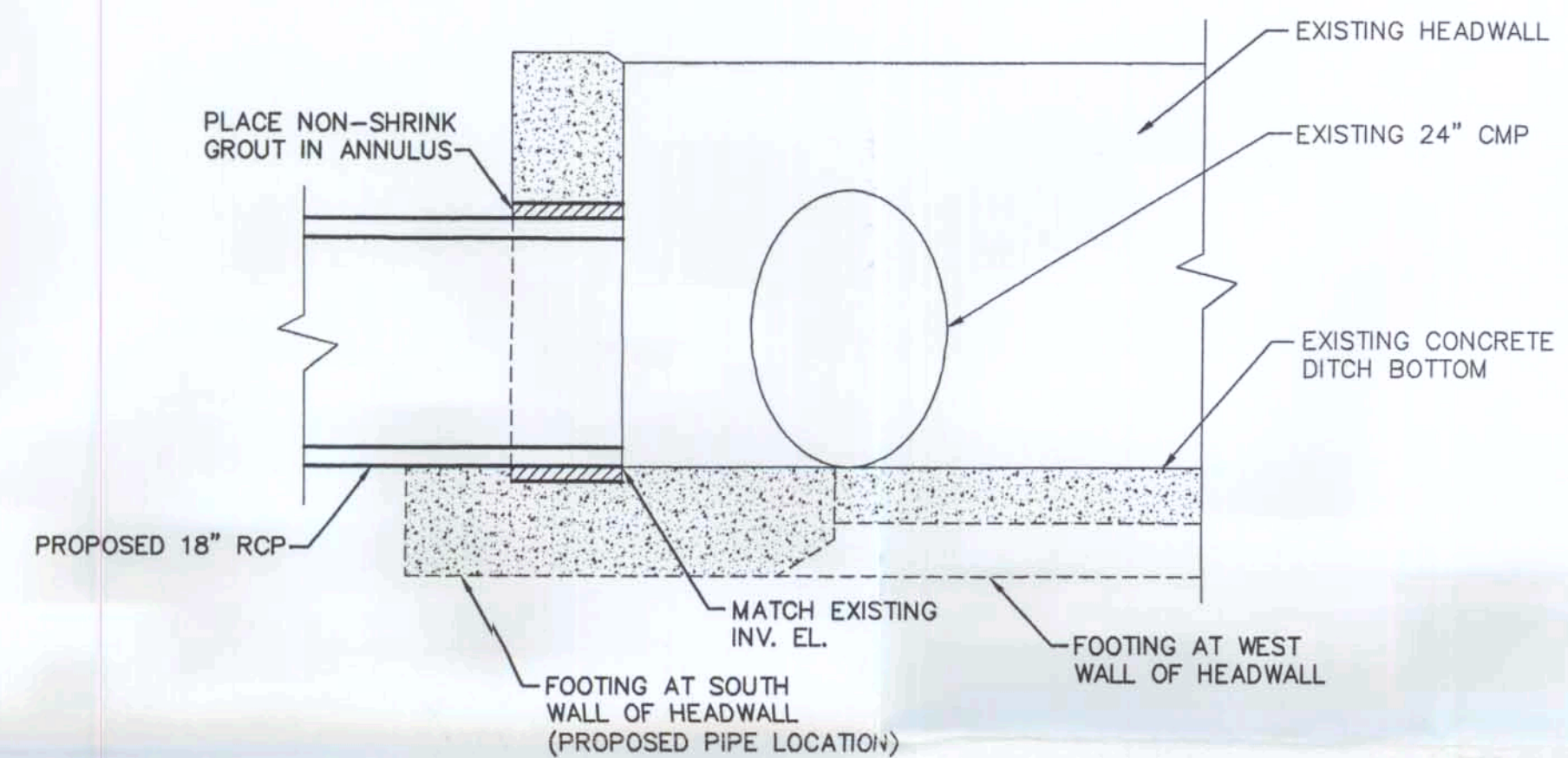
HEADWALL PLAN

DETAIL

NOT TO SCALE

1

CL-108 CL-106



SECTION

NOT TO SCALE

A

XREF: CADD FILE: SWP/CHAT/CLOSURE/MISC-DET  
PLOT DATE: 3/19/99

REV	DATE	BY	SUB	APP	DESCRIPTION	REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED  
S.A. LIND  
DRAWN  
C.K. BUDSOCK  
CHECKED  
S.E. BLEVINS  
IN CHARGE  
S.B. HARVEY  
DATE 19 MARCH 99

SOUTHERN WOOD PIEDMONT CO.

CHATTANOOGA, TENNESSEE

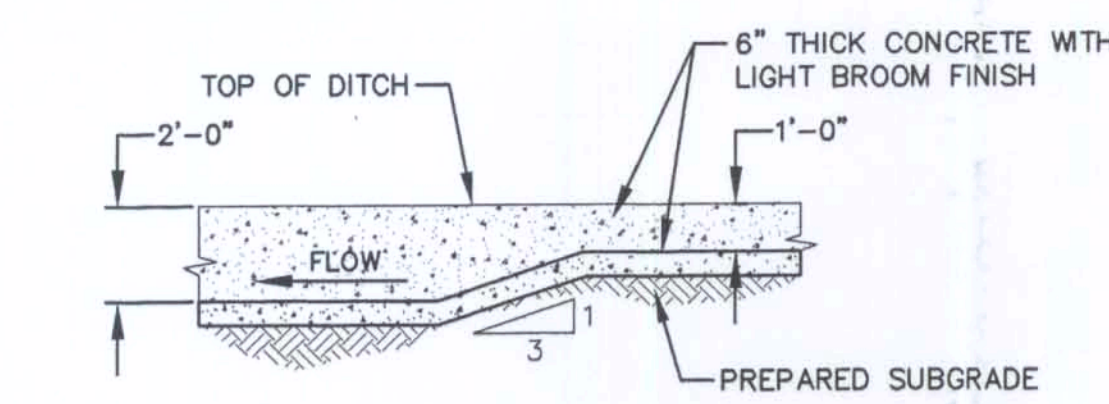


LAW  
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

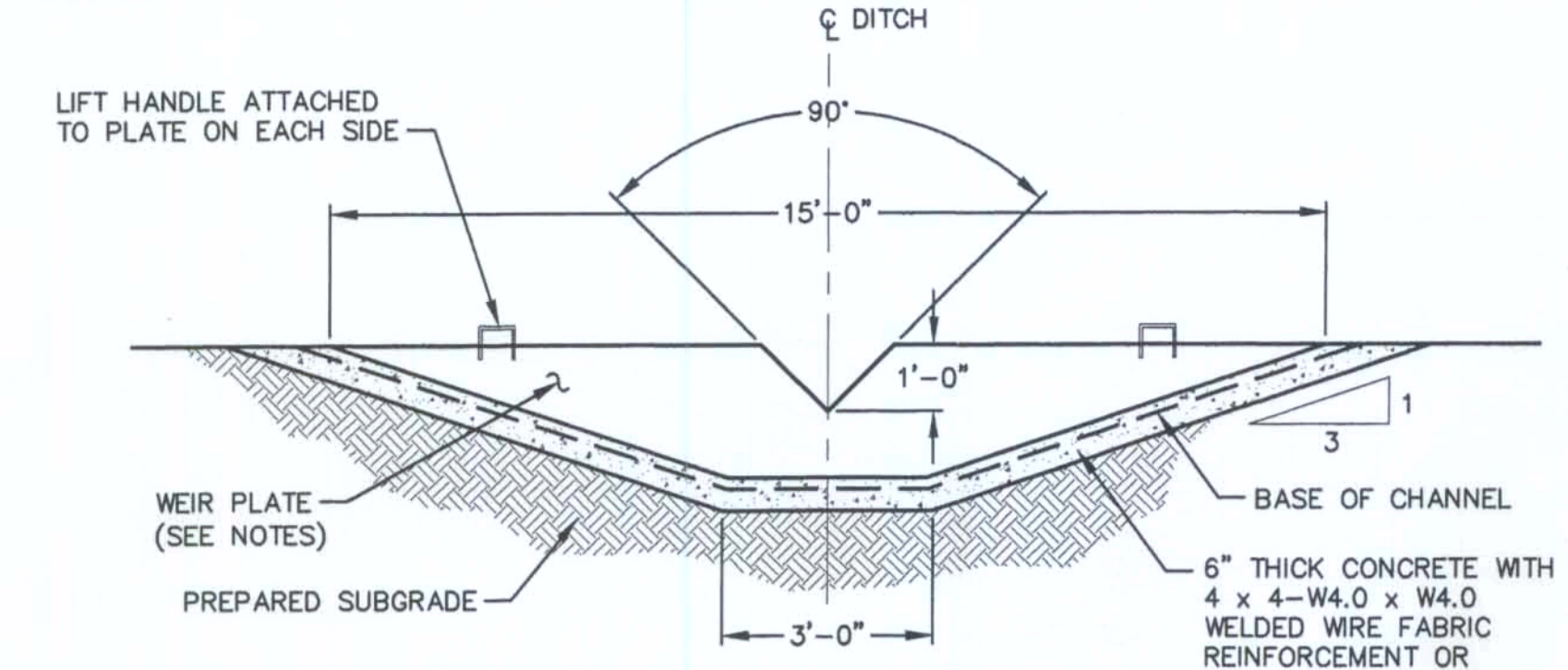
HEADWALL SECTIONS  
AND DETAILS

SCALE	
AS SHOWN	
CONTRACT	
30300-9-0500	
DWG. NO.	REV PAGE NO
CL-108	0 8

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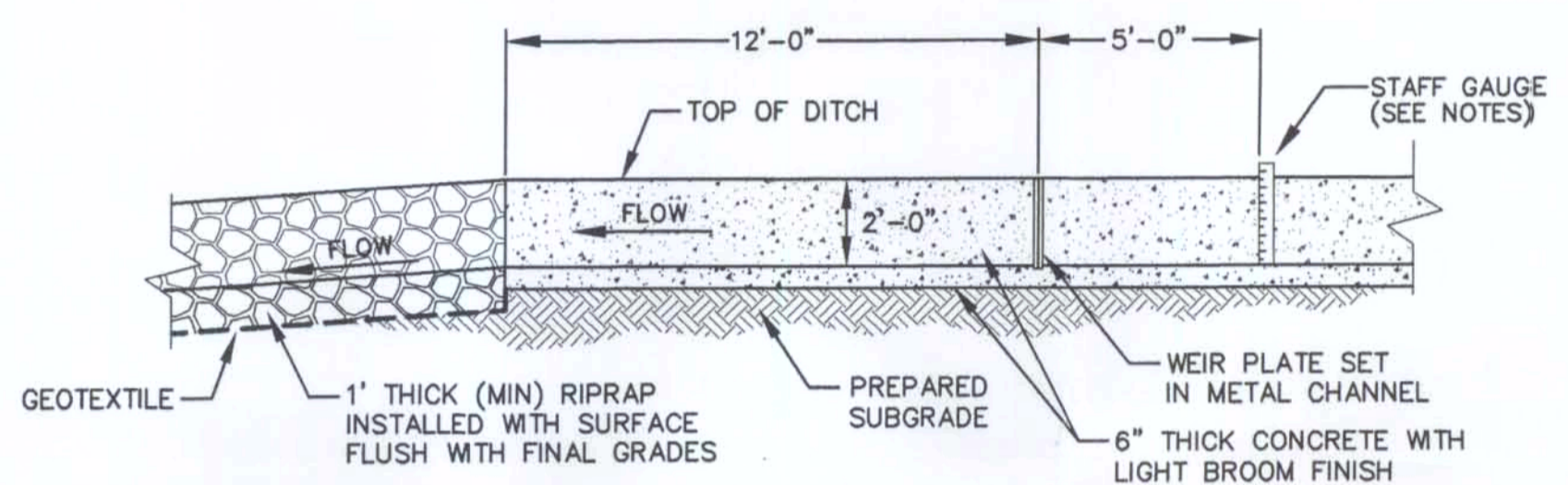
**DITCH DEPTH TRANSITION PROFILE**  
**SECTION A**  
 SCALE: 1/4"=1'-0"



NOTES: 1. WEIR PLATE SHALL BE FABRICATED FROM ALUMINUM OR FIBERGLASS REINFORCED PLASTIC (FRP), 1/4-INCH MINIMUM THICKNESS. PROVIDE STIFFENERS AND SUPPORT GUSSETS AT BASE AND AT OTHER REQUIRED LOCATIONS FOR STABILITY.  
 2. PROVIDE GASKETING AT BASE FOR WATERTIGHT CONNECTION WHEN SET IN CHANNEL.

**FLOW MONITORING V-NOTCH WEIR PLATE DETAIL**

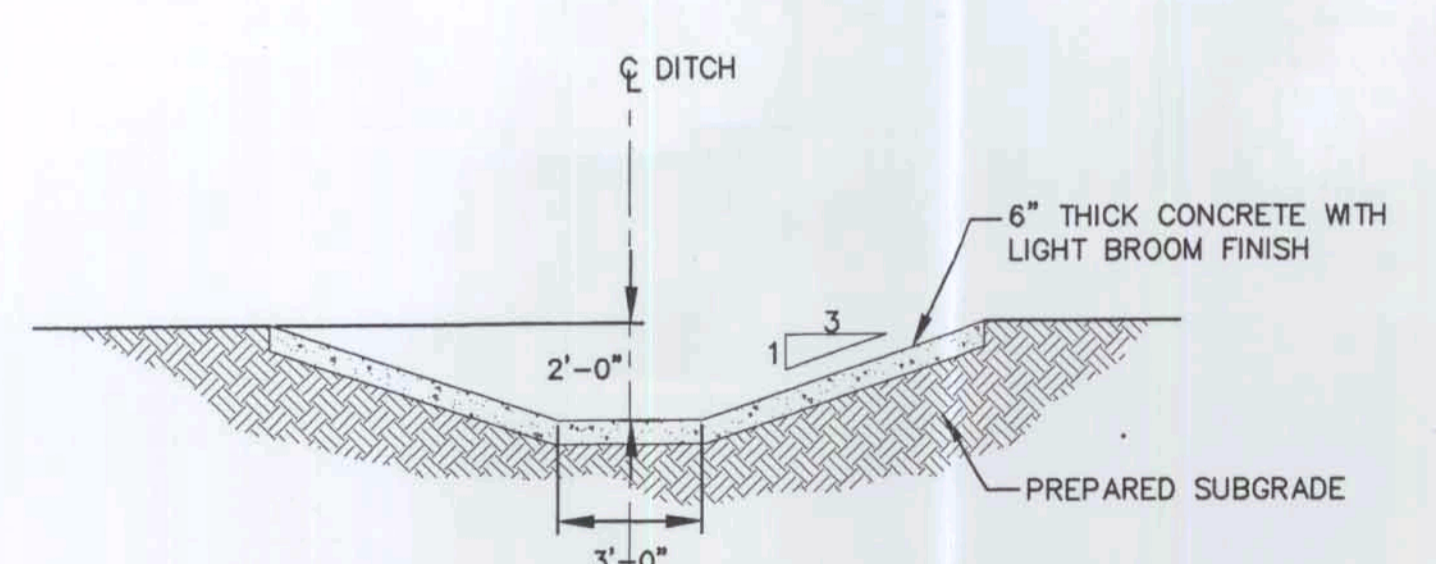
**SECTION D**  
 SCALE: 3/8"=1'-0"



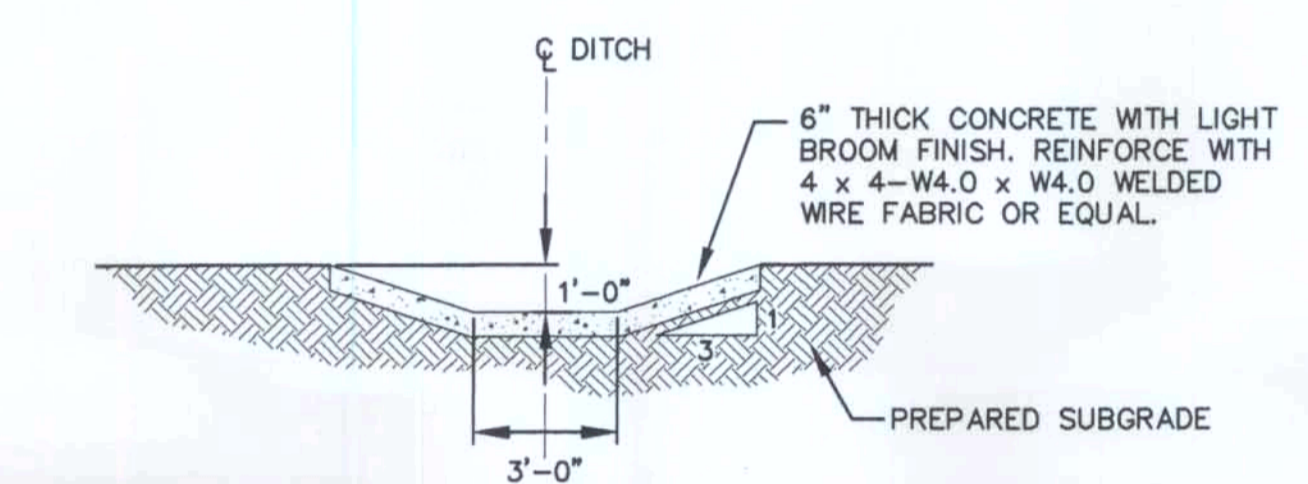
NOTES: 1. STAFF GAUGE SHALL BE MADE FROM DURABLE COATED METAL WITH GRADATIONS MARKED LEGIBLY AT EVERY TENTH AND HUNDREDTH FOOT. EACH TENTH OF A FOOT MARK SHALL BE LABELED.  
 2. ATTACH GAUGE TO A STABLE POST SET IN CONCRETE. POST SHALL BE VERTICAL. THE "0" MARK SHALL BE AT SAME ELEVATION AS THE WEIR CREST.

**FLOW MONITORING STRUCTURE PROFILE**

**SECTION B**  
 SCALE: 1/4"=1'-0"

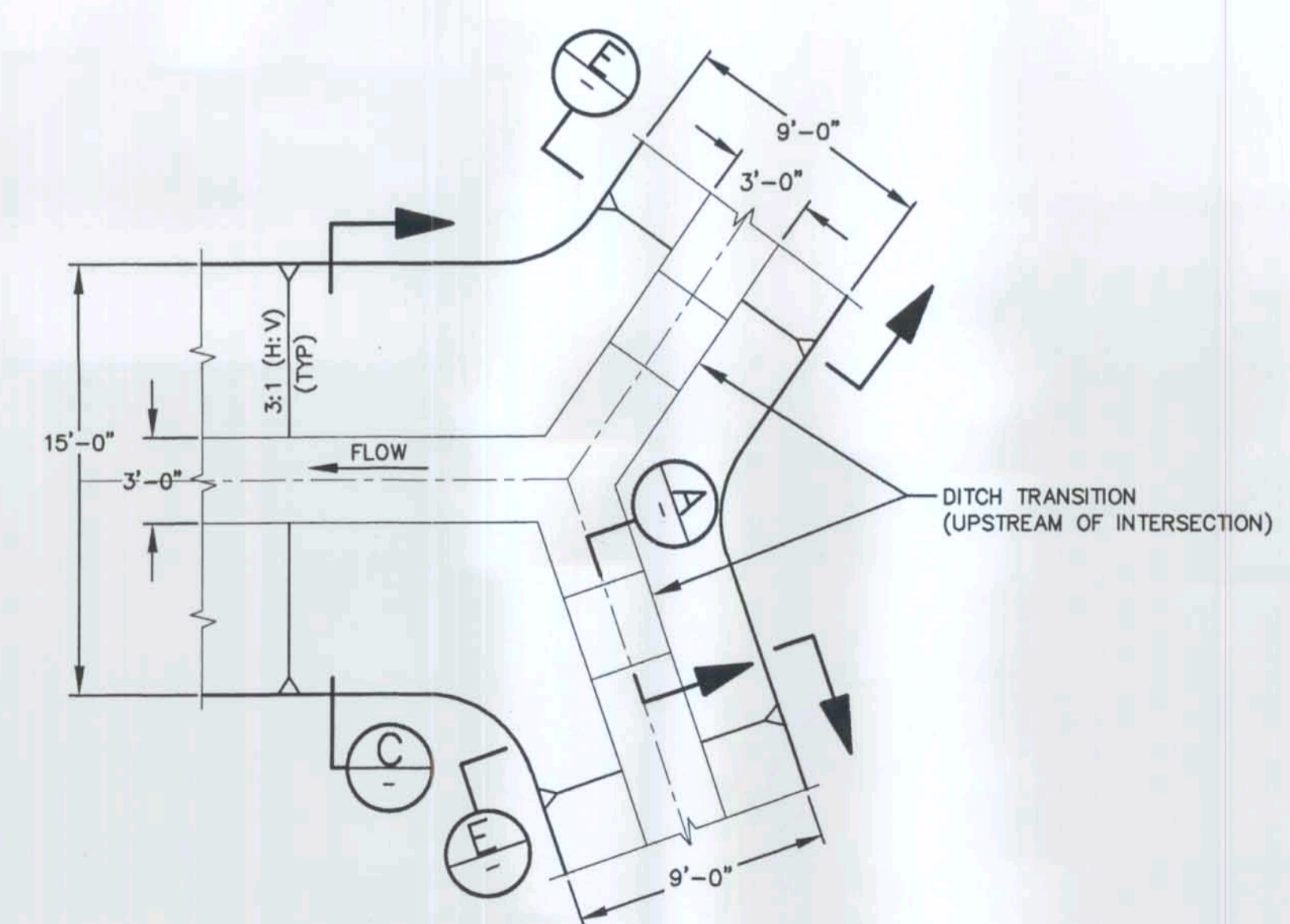


**2 FOOT DEEP DITCH**  
**SECTION C**  
 SCALE: 1/4"=1'-0"  
 CL-109 CL-104



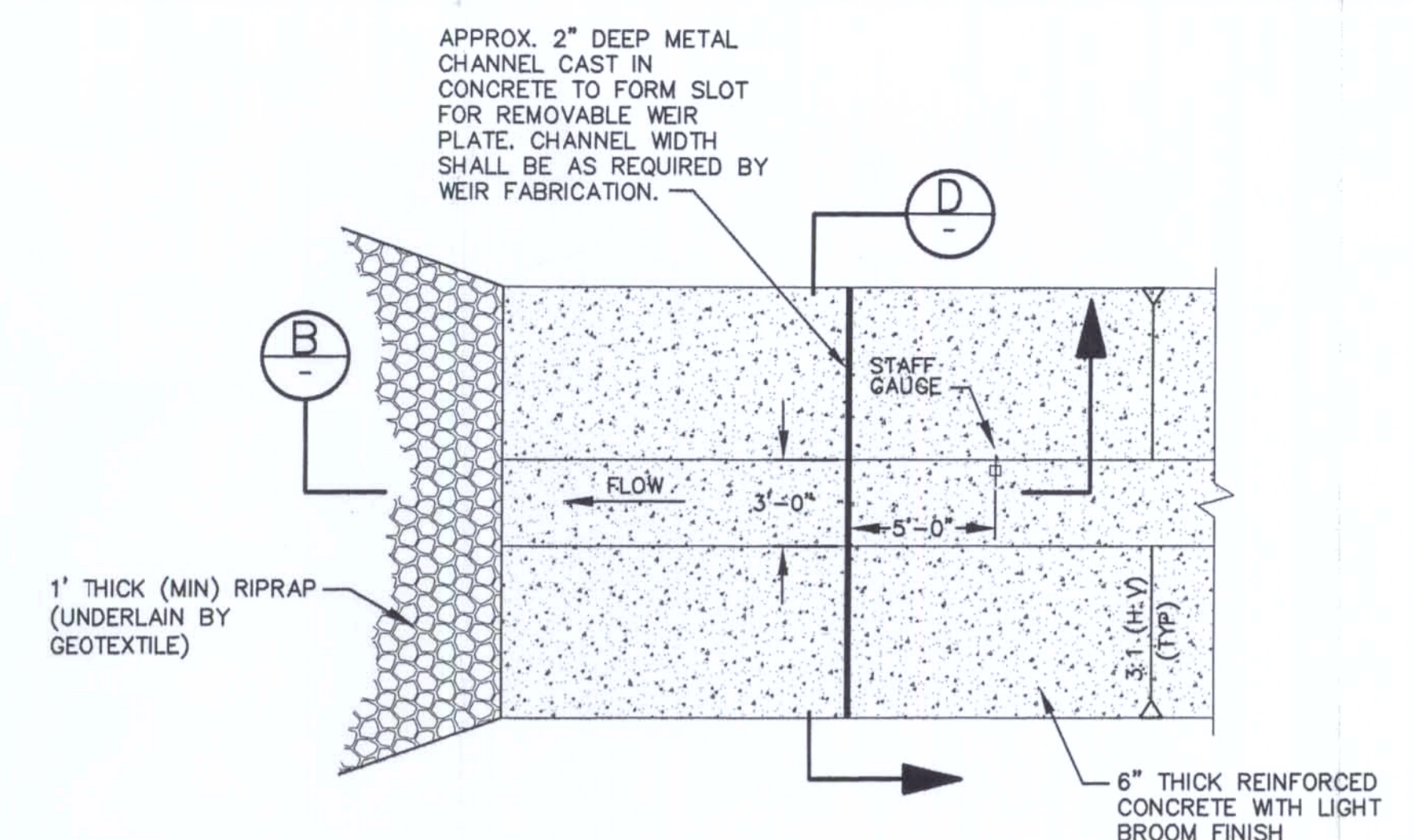
**1 FOOT DEEP DITCH**

**SECTION E**  
 SCALE: 1/4"=1'-0"



**DITCH TRANSITION PLAN**

**DETAIL 1**  
 SCALE: 3/16"=1'-0"  
 CL-109 CL-103



**FLOW MONITORING STRUCTURE PLAN**

**DETAIL 2**  
 SCALE: 3/16"=1'-0"  
 CL-109 CL-103 CL-104

D FILE: SWP/CHAT/CLOSURE/FLOW-DTL  
 T DATE: 3/19/99

DESIGNED  
 S.H. WOLD/S.A. LIND  
 DRAWN  
 C.K. BUDSOCK  
 CHECKED  
 S.E. BLEVINS  
 IN CHARGE  
 S.B. HARVEY

**SOUTHERN WOOD PIEDMONT CO.**  
 CHATTANOOGA, TENNESSEE

**LAW**  
 ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

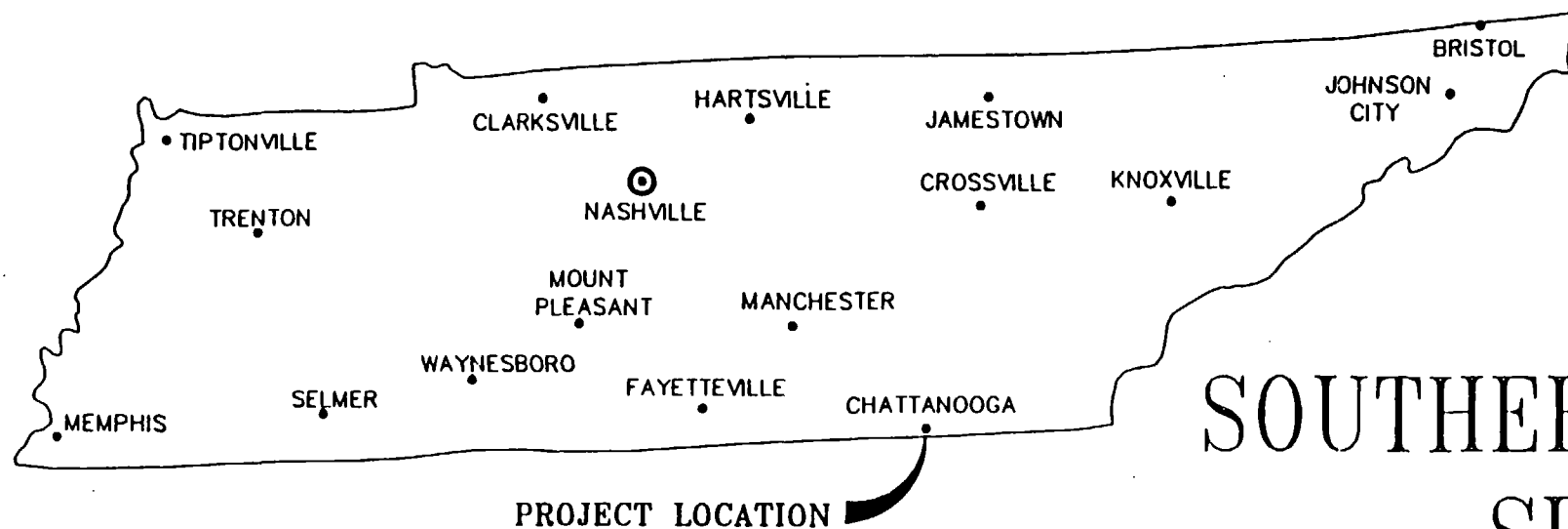
**STORMWATER DRAINAGE DITCH  
 SECTIONS AND DETAILS**

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 ENVIRONMENTAL SERVICES, INC.

SCALE  
 AS SHOWN  
 CONTRACT  
 30300-9-0500  
 DWG. NO. REV. PAGE NO.

## **Appendix B**

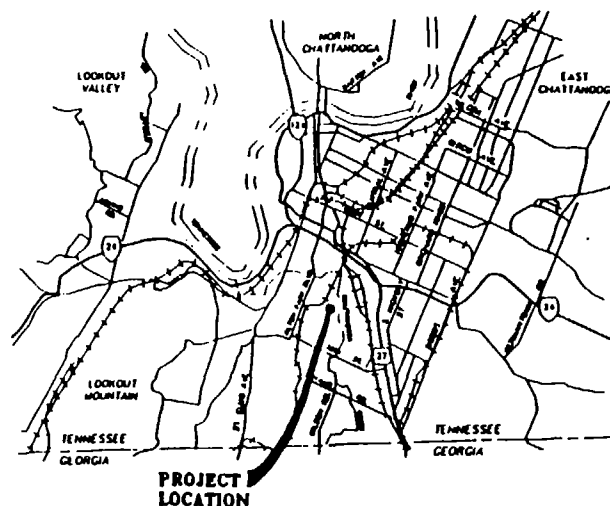
### **Recovery System As-Built Drawings**



# SOUTHERN WOOD PIEDMONT CO. SPARTANBURG, S.C. CHATTANOOGA, TENNESSEE PLANT OIL AND WATER RECOVERY SYSTEM



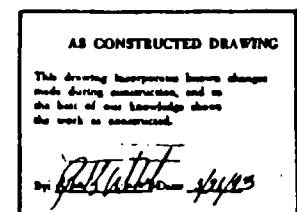
0 25 50 100 125  
SCALE IN MILES



VICINITY MAP

## INDEX

TITLE	DWG. NO.
COVER SHEET	1
SITE PLAN	2
SYSTEM SCHEMATIC	3
METERING BUILDING DETAILS	4
SUMP PIPING & CONTROLLER DETAILS	5
WELLHEAD PIPING DETAILS	6
WELLHEAD VAULT DETAILS	7
MISCELLANEOUS DETAILS	8
ELECTRICAL	E1 - E6
TECHNICAL SPECIFICATIONS	S-1 - S-4



SWP assumes responsibility for the design concept and installation of the process or installation shown in these drawings. B.P. Barber is responsible for the engineering design which converts the design concept into these drawings.

**B.P. BARBER & ASSOCIATES, INC.**  
ENGINEERS ~ SURVEYORS ~ PLANNERS

349 E. BLACKSTOCK RD.  
SPARTANBURG, S.C. 29301  
(803) 576-6610

2611 FOREST DRIVE  
P.O. BOX 1116  
COLUMBIA, S.C. 29202  
(803) 254-4400

7410 NORTHSIDE DRIVE  
NORTH CHARLESTON, S.C. 29418  
(803) 553-8595



PROJECT NO.: 92336

DATE: OCTOBER, 1992

FILE NO.

(All Pipe & Tubing Size Refer to I.D. Dimns)

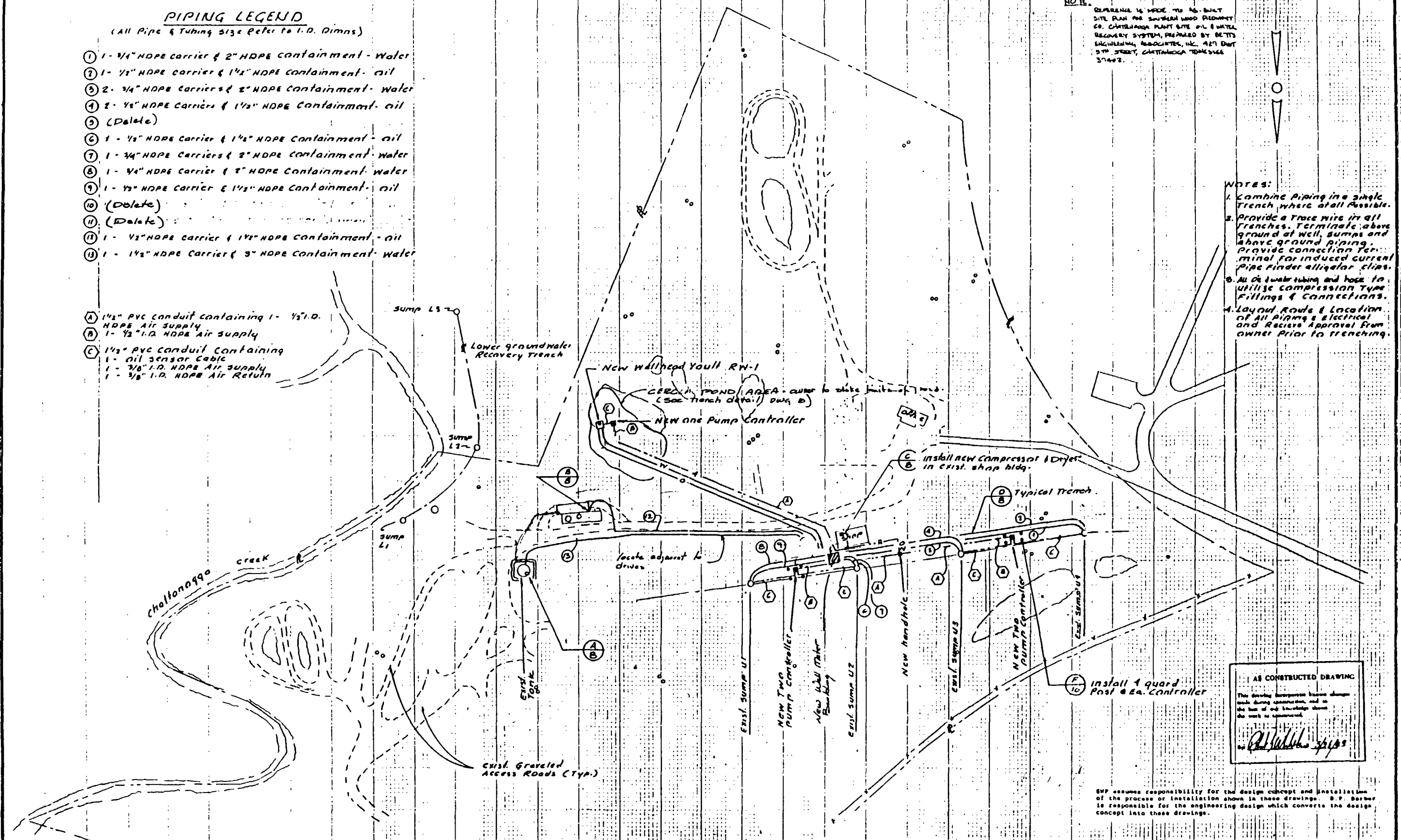
- ① 1 - 3/4" HDPE carrier & 2" HDPE containment - Water
- ② 1 - 1/2" HDPE carrier & 1 1/2" HDPE containment - Oil
- ③ 2 - 3/4" HDPE carriers & 2" HDPE containment - Water
- ④ 2 - 1/2" HDPE carriers & 1 1/2" HDPE containment - Oil
- ⑤ (Delete)
- ⑥ 1 - 1/2" HDPE carrier & 1 1/2" HDPE containment - Oil
- ⑦ 1 - 3/4" HDPE carriers & 2" HDPE containment - Water
- ⑧ 1 - 1/4" HDPE carrier & 2" HDPE containment - Water
- ⑨ 1 - 1/2" HDPE carrier & 1 1/2" HDPE containment - Oil
- ⑩ (Delete)
- ⑪ (Delete)
- ⑫ 1 - 1/2" HDPE carrier & 1 1/2" HDPE containment - Oil
- ⑬ 1 - 1 1/2" HDPE carrier & 3" HDPE containment - Water

- (A) 1 1/2" PVC conduit containing 1 - 1/2" I.D. HDPE Air supply  
(B) 1 - 1/2" I.D. HDPE Air supply  
(C) 1 1/2" PVC conduit containing  
1 - Oil sensor cable  
1 - 3/8" I.D. HDPE Air supply  
1 - 3/8" I.D. HDPE Air Return

Note:  
REFERENCE IS MADE TO AS-BUILT  
SITE PLAN FOR SOUTHERN POWER FLEETMAINT  
CO. CHATTANOOGA PLANT SITE OIL & WATER  
RECOVERY SYSTEM, PREPARED BY BE TTS  
ENGINEERING ASSOCIATES, INC. 427 DOWNT  
5TH STREET, CHATTANOOGA TENNESSEE  
37402.

Wores:

1. Combine Piping into single Trench where all Possible.
2. Provide a Trace wire in all Trenches. Terminate above ground at well, summs and above ground piping. Provide connection Terminal for induced current Pipe Finder alligator clips.
3. All Dr & Water tubing and hose to utilize Compression Type Fittings & Connections.
4. Layout Route & Location of all Piping & Electrical and Receive Approval from owner Prior to trenching.



AS CONSTRUCTED DRAWING

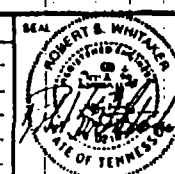
This drawing incorporates known changes made during construction and as the best of my knowledge shows the work as constructed.

Attest: 3/2/09

SWP assumes responsibility for the design concept and installation of the process or installation shown in these drawings. B. F. Barber is responsible for the engineering design which converts the design concept into these drawings.

[illegible]

APPROVALS	
PROJECT ENGR	RSW
DESIGNED BY	RSW
DRAWN BY	JMS
CHECKED BY	RSW
APPROVED BY	RSW

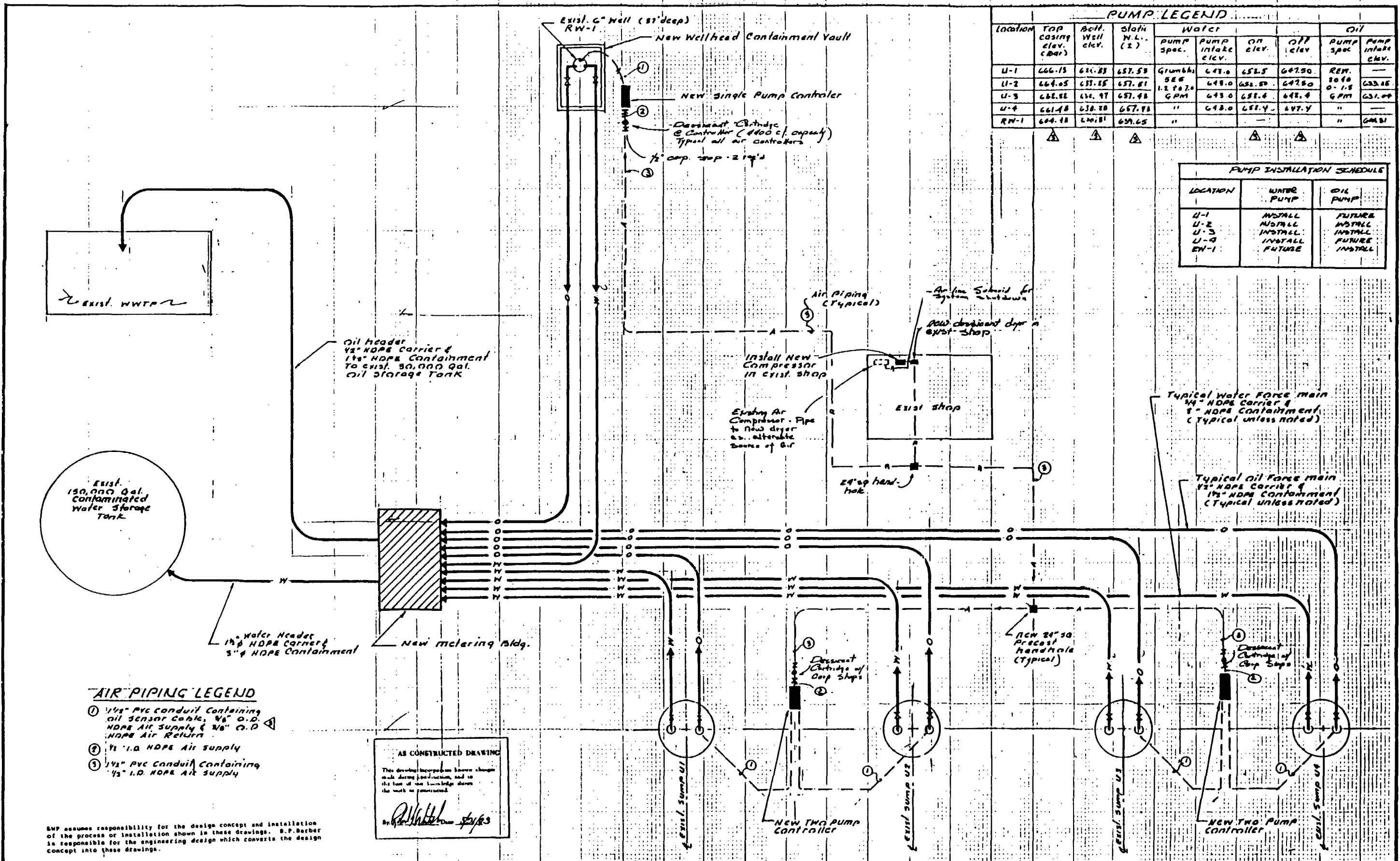


**B. F. BARBER & ASSOCIATES, INC.**  
ENGINEERS • SURVEYORS • PLANNERS  
340 EAST BLACKSTOCK ROAD  
SPARTANBURG, S.C. 29381  
803-576-0910

PROJECT  
SOUTHERN WOOD PIEDMONT CO.  
CHATTANOOGA PLANT SITE  
OIL AND WATER RECOVERY SYSTEM

SHEET TITLE	
SITE PLAN	
1" = 100'	0" = 100' 0" 100'

10-100-1  
 10-100-2  
 10-100-3  
 10-100-4  
 10-100-5



PUMP LEGEND									
Location	Top casing elev. (bar)	Bottom Well elev.	Static W.L. (2)	Water			Oil		
				Pump Spec.	Pump Intake Elev.	Oil Elev.	Pump Spec.	Pump Intake Elev.	Oil Elev.
U-1	666.13	611.83	657.53	Grumbeck 556	643.0	652.5	REV.	3010	633.15
U-2	664.05	617.85	657.81	1.2 to 7.0 GPM	643.0	652.5	642.5	642.5	631.00
U-3	666.82	616.97	657.43	"	643.0	652.5	642.5	642.5	631.00
U-4	661.18	618.78	657.93	"	643.0	652.5	642.5	642.5	631.00
RW-1	664.18	611.81	657.65	"	643.0	652.5	"	642.5	631.00

PUMP INSTALLATION SCHEDULE		
LOCATION	WATER PUMP	OIL PUMP
U-1	INSTALL	FUTURE
U-2	INSTALL	INSTALL
U-3	INSTALL	INSTALL
U-4	INSTALL	INSTALL
RW-1	INSTALL	INSTALL

- AIR PIPING LEGEND**
- ① 1/2" PVC conduit containing oil sensor cable, 1/2" O.D. HDPE Air Supply & 1/2" O.D. HDPE Air Return
  - ② 1/2" I.D. HDPE Air Supply
  - ③ 1/2" PVC conduit containing 1/2" I.D. HDPE Air Supply

**AS CONSTRUCTED DRAWING**

This drawing incorporates known changes made during construction, and is the best of our knowledge during the work as constructed.

*[Signature]* 10/1/83

SMP assumes responsibility for the design concept and installation of the process or installation shown in these drawings. B.P. Barber is responsible for the engineering design which converts the design concept into these drawings.

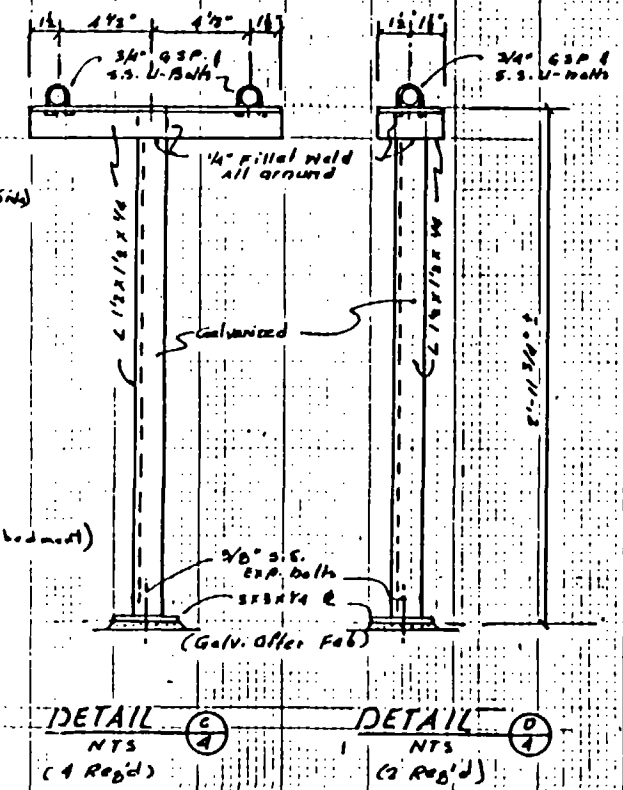
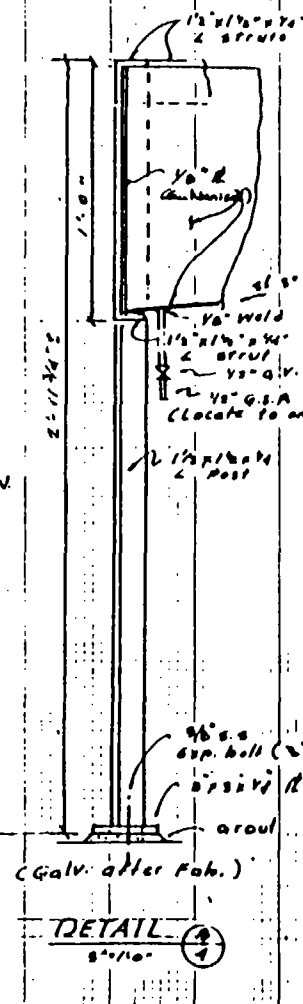
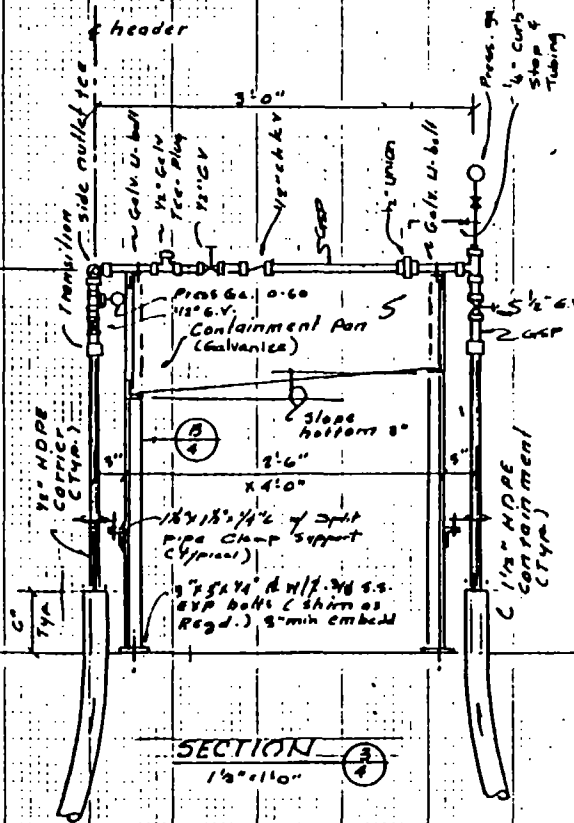
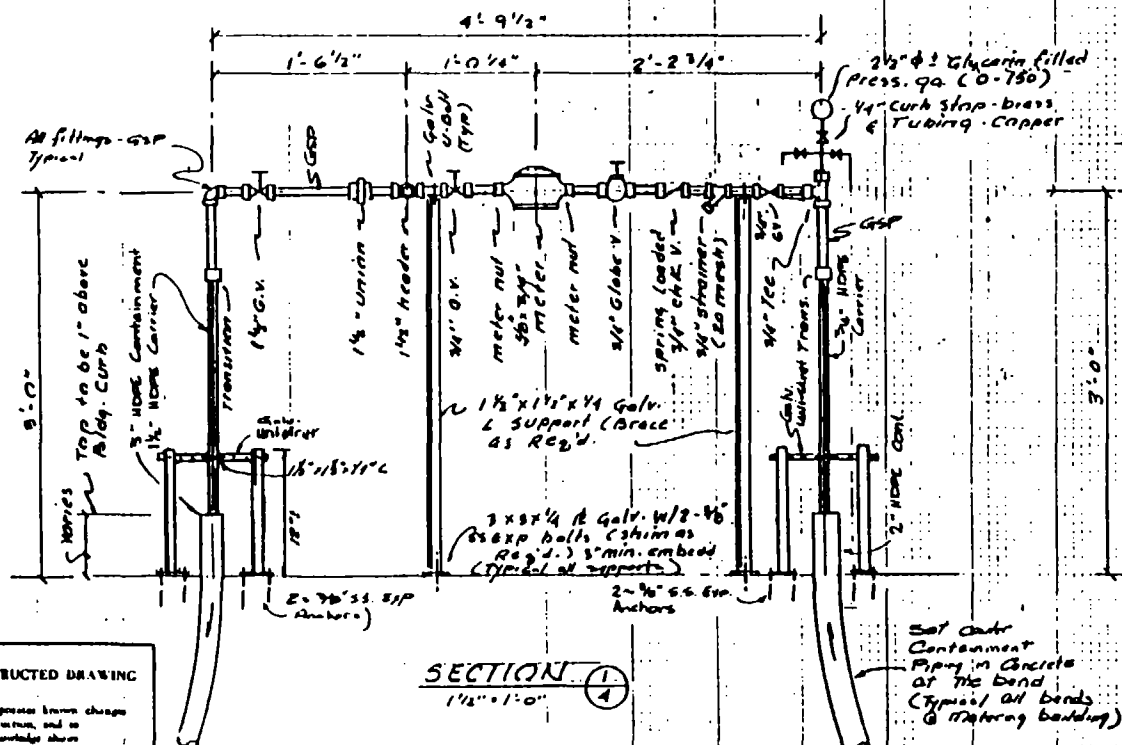
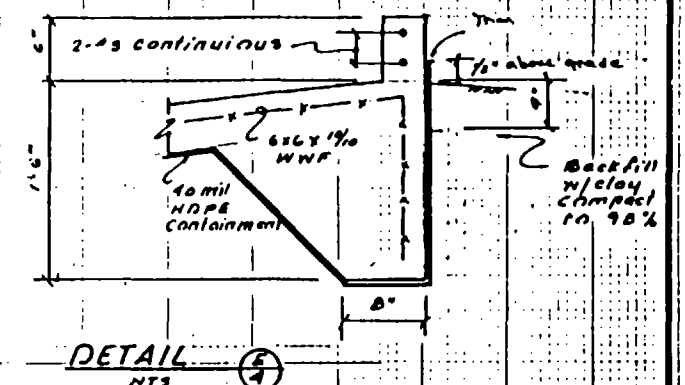
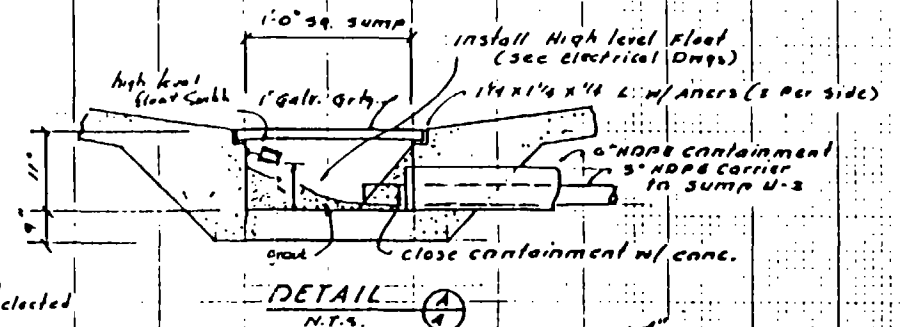
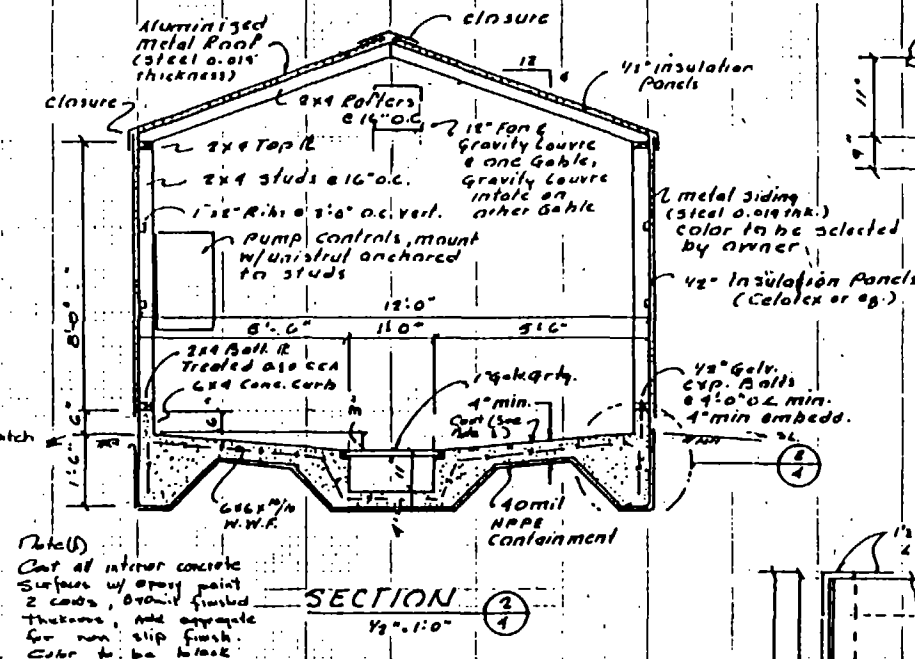
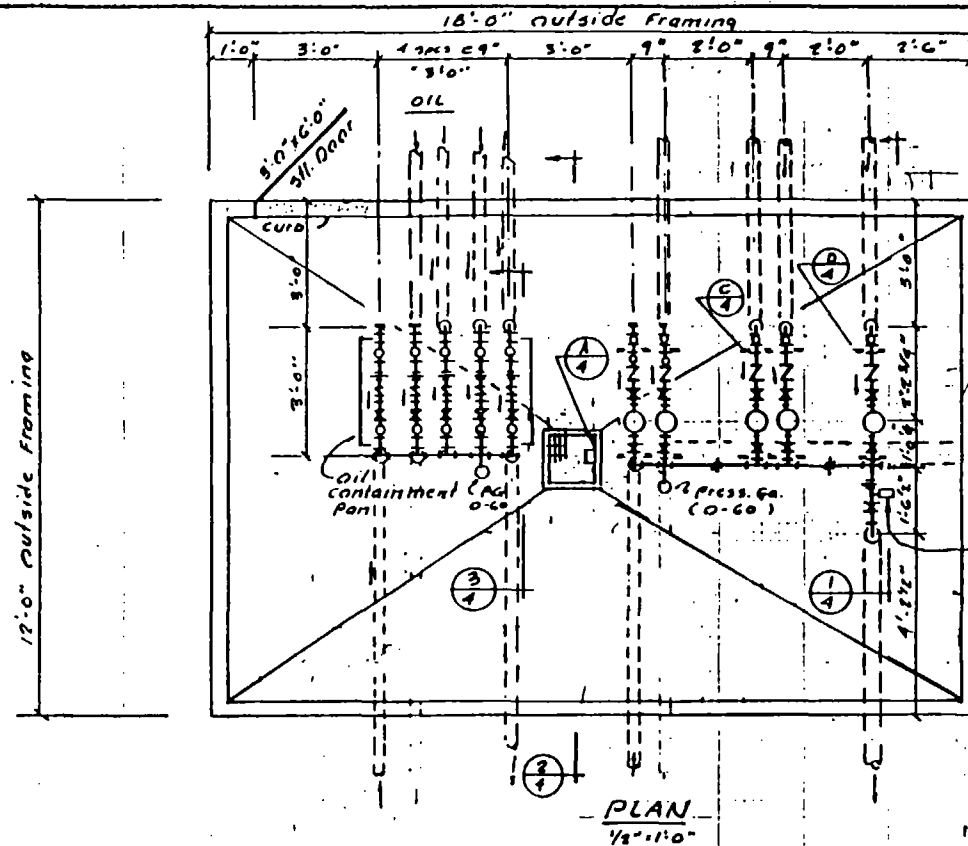
REVISIONS				APPROVALS				PROJECT		SHEET TITLE		SHEET 5	
LOCATION	DESCRIPTION	DATE	BY	APP	PROJECT ENGR	DESIGNED BY	DRAWN BY	PROJECT	CHATTANOOGA PLANT SITE	SYSTEM SCHEMATIC	DATE	DATE	DATE
	GENERAL REVISIONS	10/1/83	BSW	BSW	BSW	BSW	BSW	ENGINEERS • SURVEYORS • PLANNERS	340 EAST BLACKSTONE ROAD	SPARTANBURG, S.C. 29301	02-136	02-136	02-136
	Revised per built	10/1/83	BSW	BSW	BSW	BSW	BSW	202-874-9410					

**B.P. BARBER & ASSOCIATES, INC.**  
ENGINEERS • SURVEYORS • PLANNERS  
340 EAST BLACKSTONE ROAD  
SPARTANBURG, S.C. 29301  
202-874-9410

**PROJECT**  
SOUTHERN WOOD PIEDMONT CO.  
CHATTANOOGA PLANT SITE  
OIL AND WATER RECOVERY SYSTEM

**SHEET TITLE**  
SYSTEM SCHEMATIC

**SHEET 5**  
OF 5  
REF. 02-136  
NO. NO.  
FILE NO.



AS CONSTRUCTED DRAWING

This drawing incorporates known changes made during construction, and is the basis of our knowledge of the work as constructed.

*[Signature]* 4/2/93

REVISIONS				APPROVALS				PROJECT				SHEET TITLE			
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION	DESCRIPTION	DATE	BY	APP	PROJECT ENGR	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	
1	GENERAL REVISIONS	4/2/93	RSW	RSW						PROJECT ENGR	RSW	JMS	RSW	RSW	
2	Revised Drain Sump to U-2	4/2/93	RSW	RSW						DESIGNED BY	RSW	JMS	RSW	RSW	
3	Rev. to Per M. Bull	4/2/93	RSW	RSW						DRAWN BY	RSW	JMS	RSW	RSW	
										CHECKED BY	RSW	JMS	RSW	RSW	
										APPROVED BY	RSW	JMS	RSW	RSW	

PROJECT: SOUTHERN WOOD PIEDMONT CO. CHATTANOOGA PLANT SITE OIL AND WATER RECOVERY SYSTEM

SHEET: 1 OF 1

REF: 08330

DATE: OCTOBER 1992

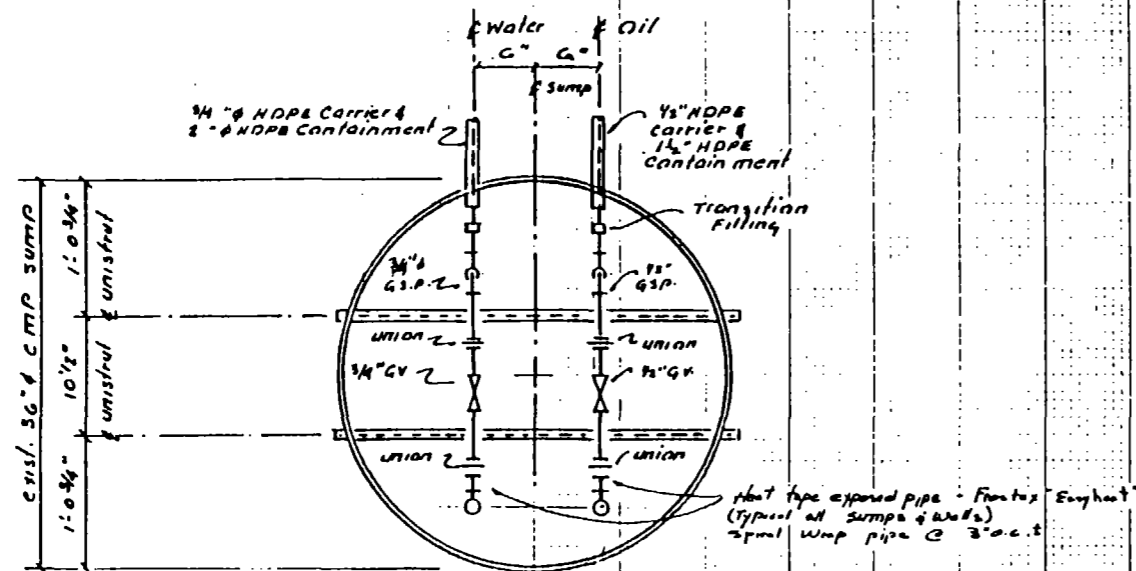
W. P. BARBER & ASSOCIATES, INC.

ENGINEERS • SURVEYORS • PLANNERS

240 EAST BLACK OAK ROAD

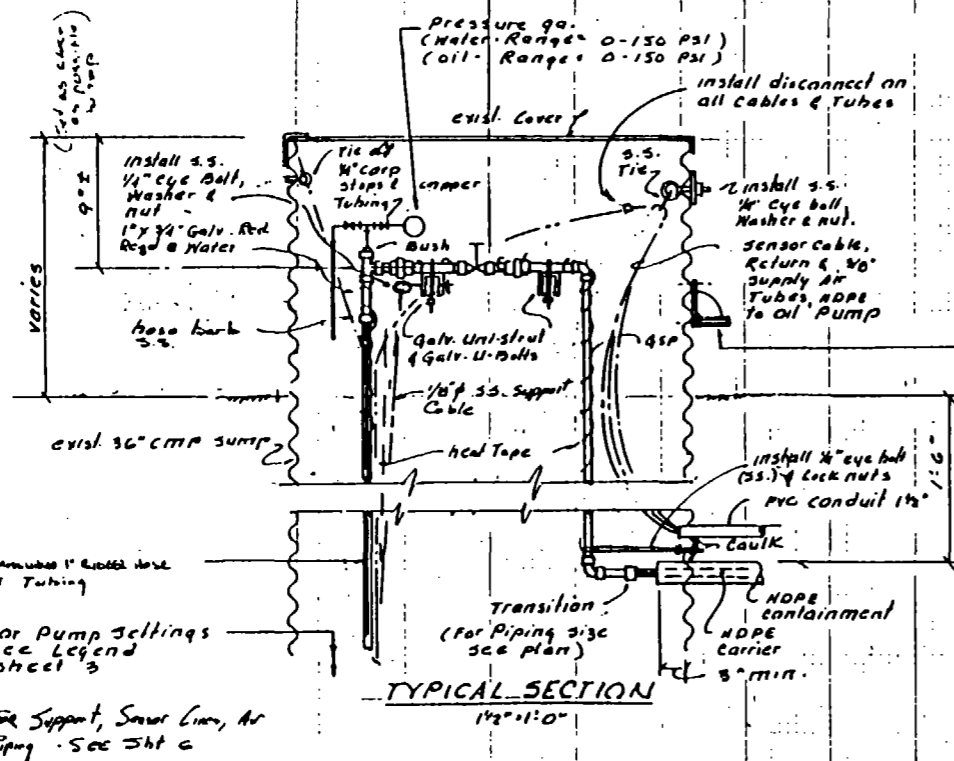
SPRINGFIELD, IL 62761

217-476-0610



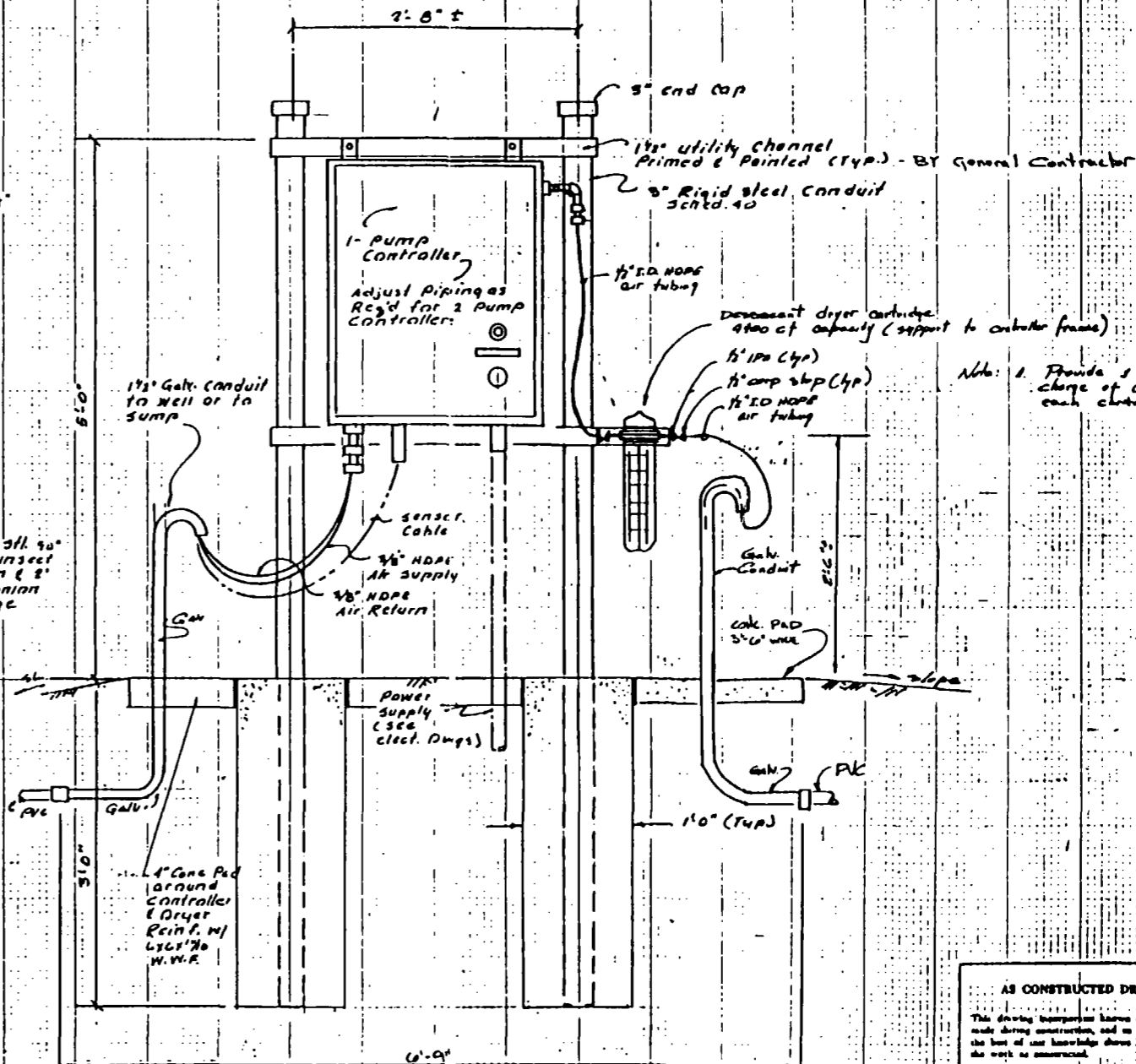
PLAN

1 1/2" x 1'0"  
Pressure ga.  
(Water Range 0-150 PSI)  
(Oil Range 0-150 PSI)



TYPICAL SECTION

SUMP DETAILS



OIL PUMP CONTROLLER DETAIL

N.T.S.

AS CONSTRUCTED DRAWING

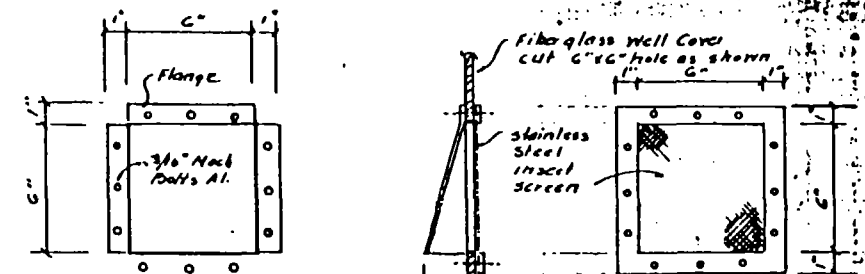
This drawing represents known changes made during construction, and on the basis of our knowledge shows the work as constructed.

By *[Signature]* *[Signature]*

SWP assumes responsibility for the design concept and installation of the property or installation shown in these drawings. B.P. Barber is responsible for the engineering design which converts the design concept into a set of drawings.

REVISIONS				APPROVALS				PROJECT				SHEET TITLE				SHEET 5			
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION	DESCRIPTION	DATE	BY	APP	PROJECT ENGR	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	PROJECT	SHEET TITLE	OF	REF	NO
	General Revisions	10/1/88	RSW	RSW						PROJECT ENGR	RSW	JMS	RSW	RSW	SOUTHERN WOOD PIEDMONT CO.	SUMP PIPING & CONTROLLER DETAILS	1	92336	
	Add Heat Tape	10/1/88	RSW	RSW						DESIGNED BY	RSW	JMS	RSW	RSW	CHATTANOOGA PLANT SITE				
	Rev. 61 Rev. At Build	10/1/88	RSW	RSW						DRAWN BY	RSW	JMS	RSW	RSW	OIL AND WATER RECOVERY SYSTEM				
										CHECKED BY	RSW	JMS	RSW	RSW					
										APPROVED BY	RSW	JMS	RSW	RSW					



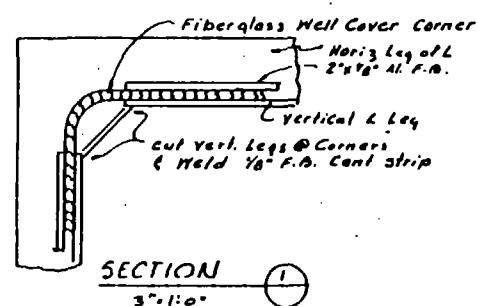


OUTSIDE HOOD SECTION INSIDE FLANGE

outside hood & inside flange A to be fabricated from 90° Aluminum.

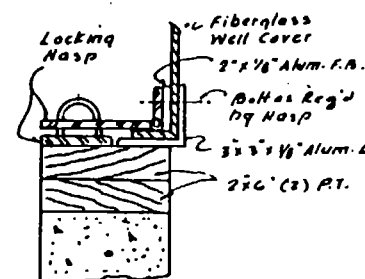
VENT DETAIL

30.10.01



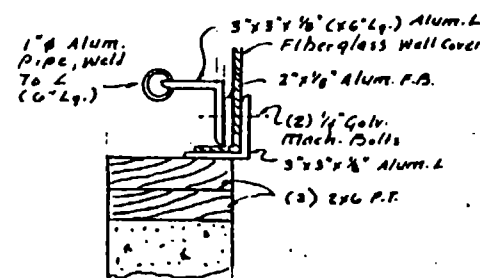
## SECTION

Value:



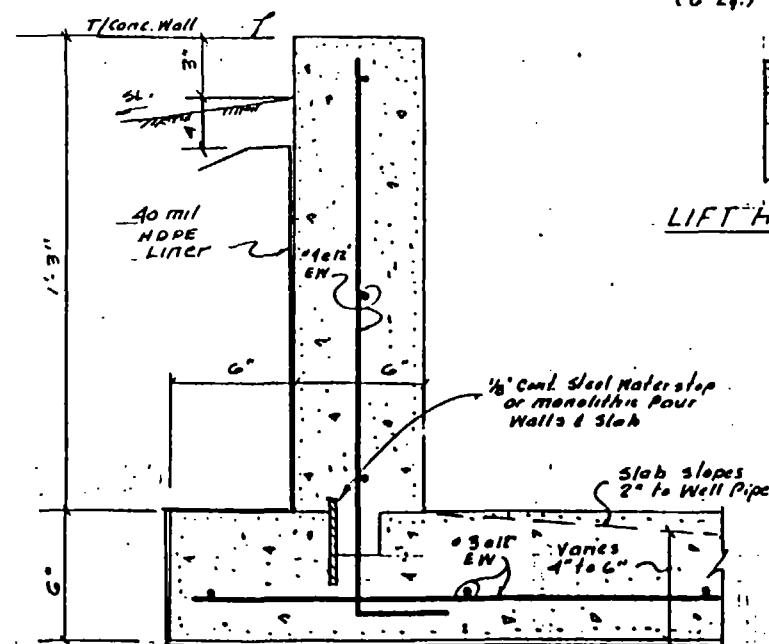
LOCK HASP DETAIL

N.I.S.



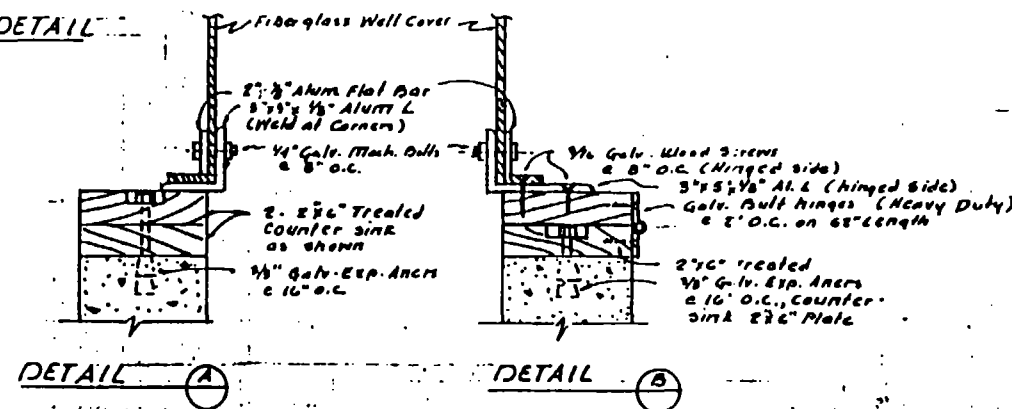
LIFT HANDLE DETAIL

N.T. 3.



### TYPICAL WALL DETAIL

50100



DETAIL (A)

DETAIL (B)

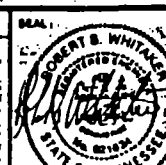
**AS CONSTRUCTED DRAWING**

This driving importance has changed much during construction, and in the face of our knowledge about the work is concerned.

*Alb. Hart*

REVISIONS											
LOCATION		DESCRIPTION	DATE	BY	APP	LOCATION		DESCRIPTION	DATE	BY	APP
	△						△				
	△						△				
	△						△				
	△						△				

APPROVALS	
PROJECT ENGR	RSW
DESIGNED BY	RSW
DRAWN BY	JMS
CHECKED BY	RSW
APPROVED BY	RSW



PROJECT  
SOUTHERN WOOD PIEDMONT CO.  
CHATTANOOGA PLANT SITE  
OIL AND WATER RECOVERY SYSTEM

**SHEET 111M**

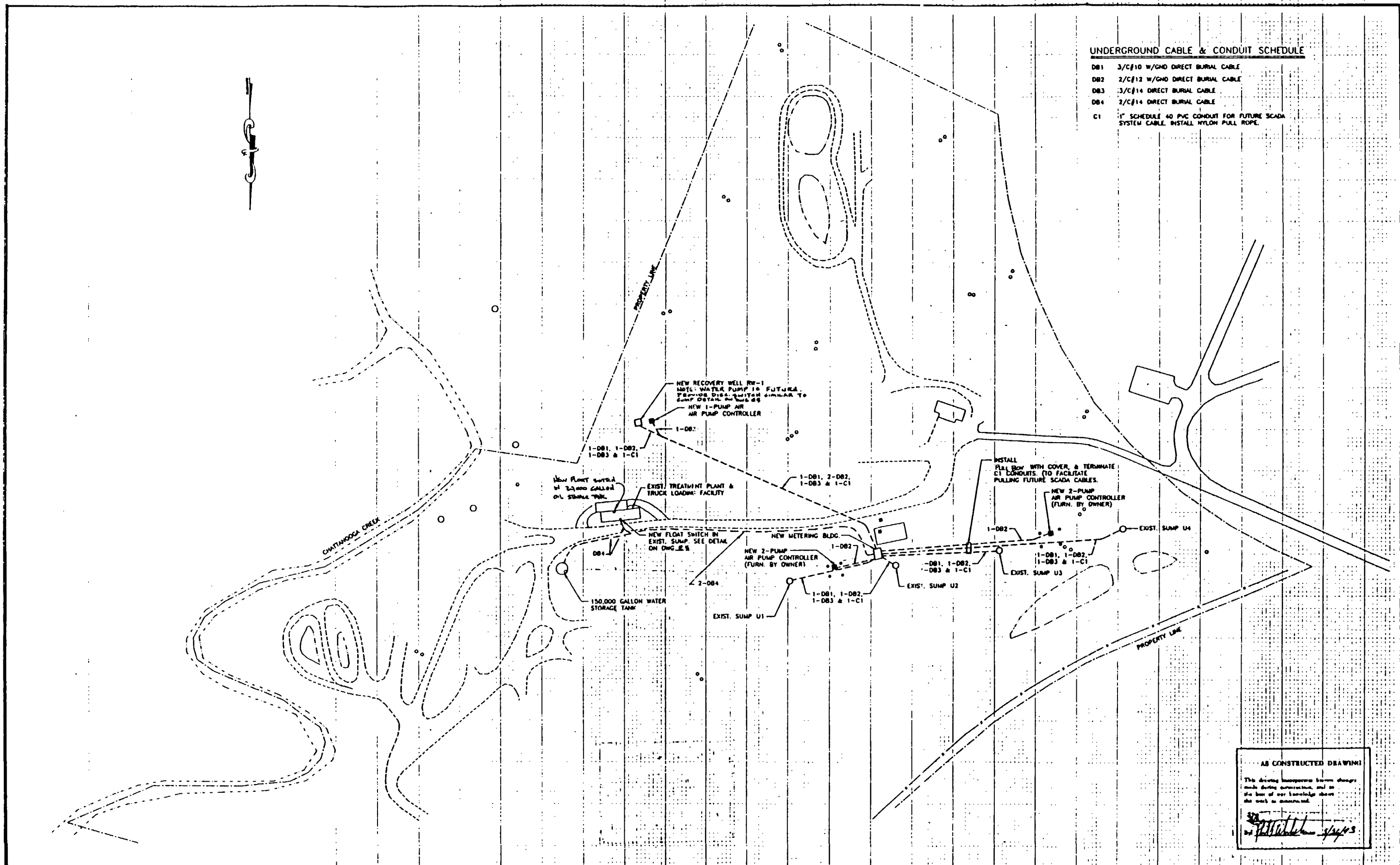
WELLHEAD VAULT DETAILS

1-527-1000  
92336100  
1-527-1000  
92336100



# UNDERGROUND CABLE & CONDUIT SCHEDULE

- DB1 3/C#10 W/GND DIRECT BURIAL CABLE
- DB2 2/C#12 W/GND DIRECT BURIAL CABLE
- DB3 3/C#14 DIRECT BURIAL CABLE
- DB4 2/C#14 DIRECT BURIAL CABLE
- C1 1" SCHEDULE 40 PVC CONDUIT FOR FUTURE SCADA SYSTEM CABLE. INSTALL NYLON PULL ROPE.

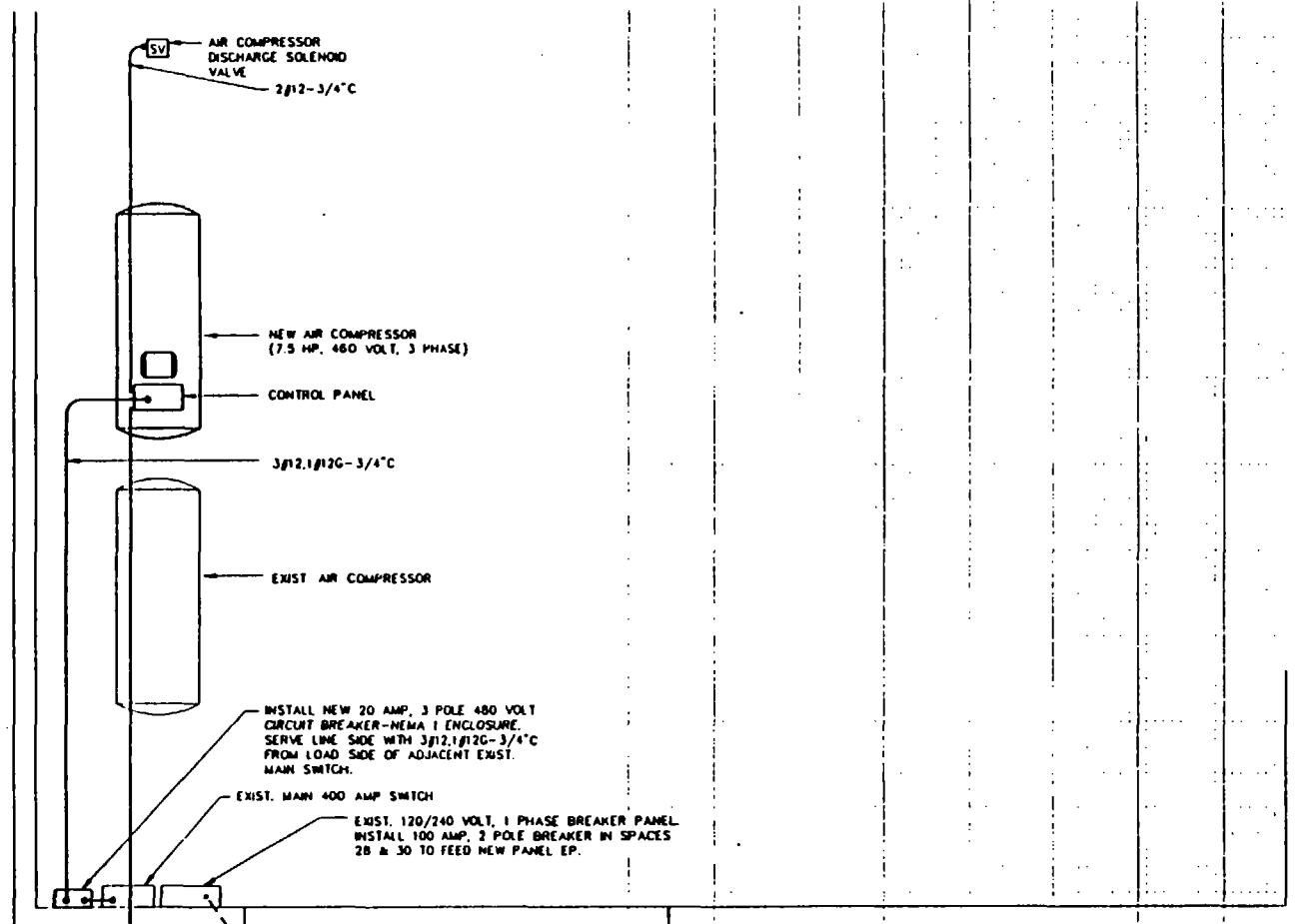


AS CONSTRUCTED DRAWING

This drawing represents known changes made during construction and is the best of our knowledge shown the work to be constructed.

*[Signature]*

REVISIONS				APPROVALS				PROJECT				SHEET TITLE			
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION	DESCRIPTION	DATE	BY	APP	PROJECT	ENGINEER	SHEET	TITLE	DATE	BY
	General Revision	10/1/92	RFH							SOUTHERN WOOD PIEDMONT CO.	ENGINEER	E1	ELECTRICAL SITE PLAN	OCTOBER, 1992	
	Chas. Ransom	10/1/92	RFH							CHATTANOOGA PLANT SITE	SURVEYOR	OF			
										OIL AND WATER RECOVERY SYSTEM	PLANNER	REF	02336		
												NO			
												NO			



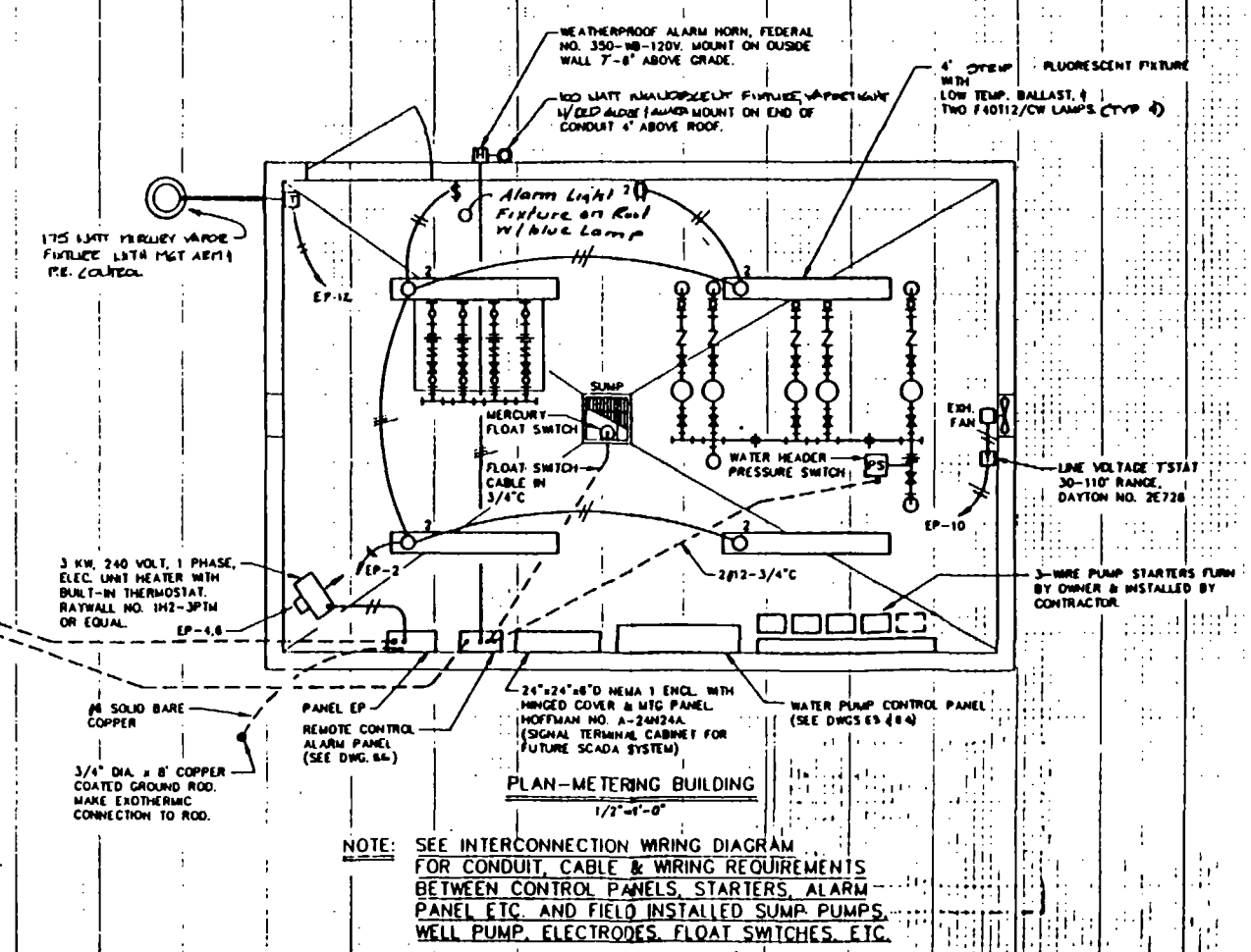
EXIST. SHOP & OFFICE  
1/2"=1'-0"

NOTE: PANEL TO BE SQUARE D TYPE MCOO OR EQUAL. PROVIDE 2 POLE, 250 VOLT LIGHTNING ARRESTER, DELTA NO. LA 302, CONNECTED TO MAIN BUS.

PANEL EP SCHEDULE

24 CIRCUIT, 120/240 VOLTS, 1 PHASE, 3 WIRE, 100 AMP. MAIN BREAKER. MOUNTING SURFACE.

DESIGNATION	WIRE SIZE	LOAD WATTS	CIRC. NO.	WIRE SIZE	LOAD WATTS	DESIGNATION
WATER PUMP CONTROL PANEL	6	5700	1	2	380	LIGHTING & RECEPTACLE
AIR PUMP CONTROL PANEL FOR SUMP U1 & U2	12	200	3	4	3000	ELEC. UNIT HEATER
AIR PUMP CONTROL PANEL FOR SUMP U3 & U4	12	200	7	8	100	REMOTE CONTROL ALARM PANEL
AIR PUMP CONTROL PANEL FOR WELL RW-1	12	100	9	10	300	EXHAUST FAN
RECEPTACLES @ SUMP U1 & U2	12	360	11	12	175	OUTSIDE LIGHT
RECEPTACLES @ SUMP U3 & U4	12	360	13	14		SPACE
RECEPTACLE @ WELL RW-1	12	180	15	16		SPACE
SPARE			17	18		SPACE
SPARE			19	20		SPACE
SPARE			21	22		SPACE
SPARE			23	24		SPACE

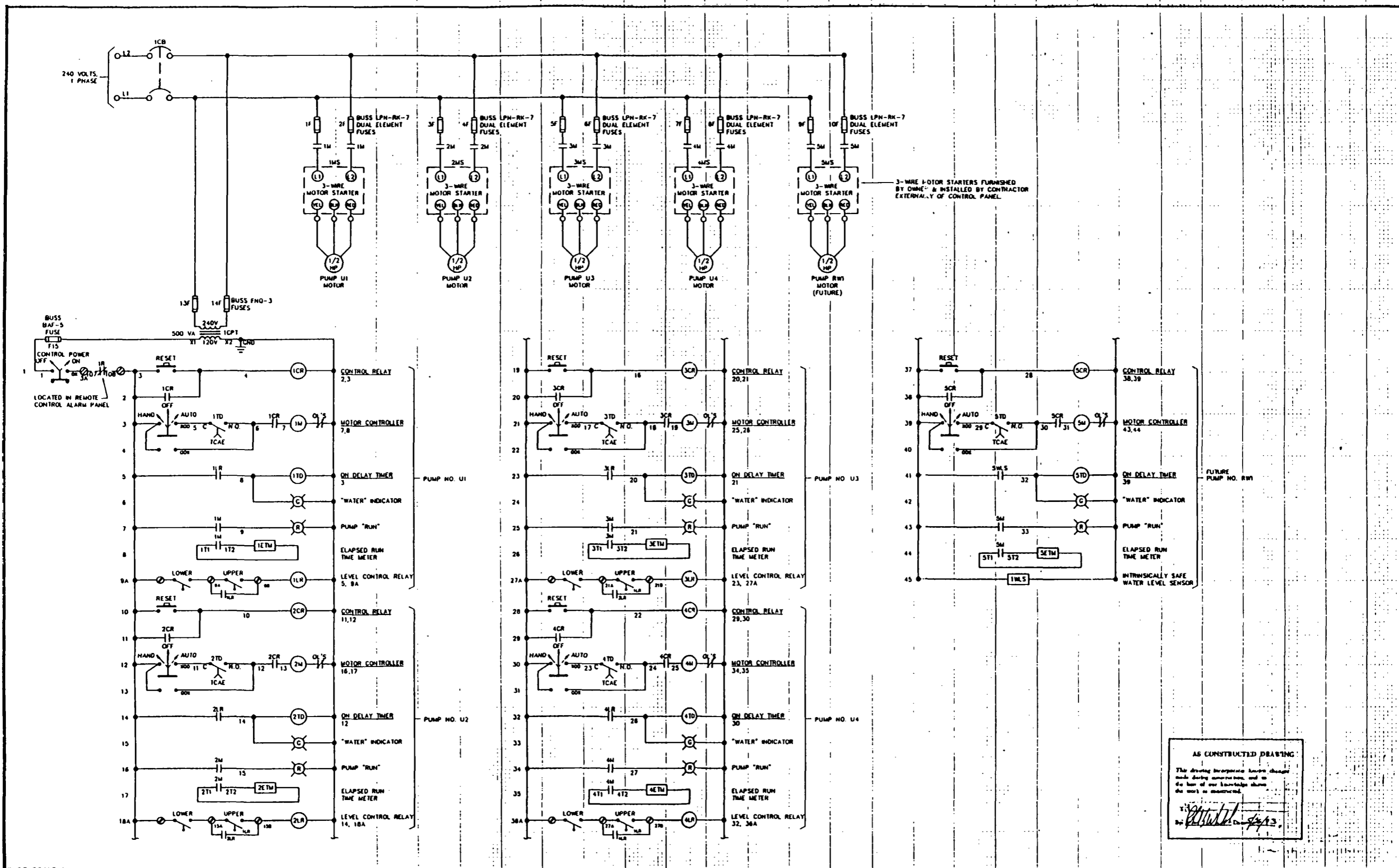


AS CONSTRUCTED DRAWING

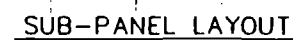
This drawing incorporates known changes made during construction, and to the best of our knowledge shows the work as constructed.

By *[Signature]* Date *4/2/03*

<b>REVISIONS</b> LOCATION DESCRIPTION DATE BY APP LOCATION DESCRIPTION DATE BY APP				<b>APPROVALS</b> PROJECT ENGR. <i>RSW</i> DESIGNED BY <i>RFH</i> DRAWN BY <i>RSW</i> CHECKED BY <i>RSW</i> APPROVED BY <i>RSW</i>				<b>PROJECT</b> SOUTHERN WOOD PIEDMONT CO. CHATTANOOGA PLANT SITE OIL AND WATER RECOVERY SYSTEM		<b>SHEET TITLE</b> ELECTRICAL PLAN NEW METERING BUILDING & EXIST. SHOP & OFFICE		SCALE: AS NOTED DATE: OCTOBER 1998
---	--	--	--	--	--	--	--	---	--	--	--	---------------------------------------



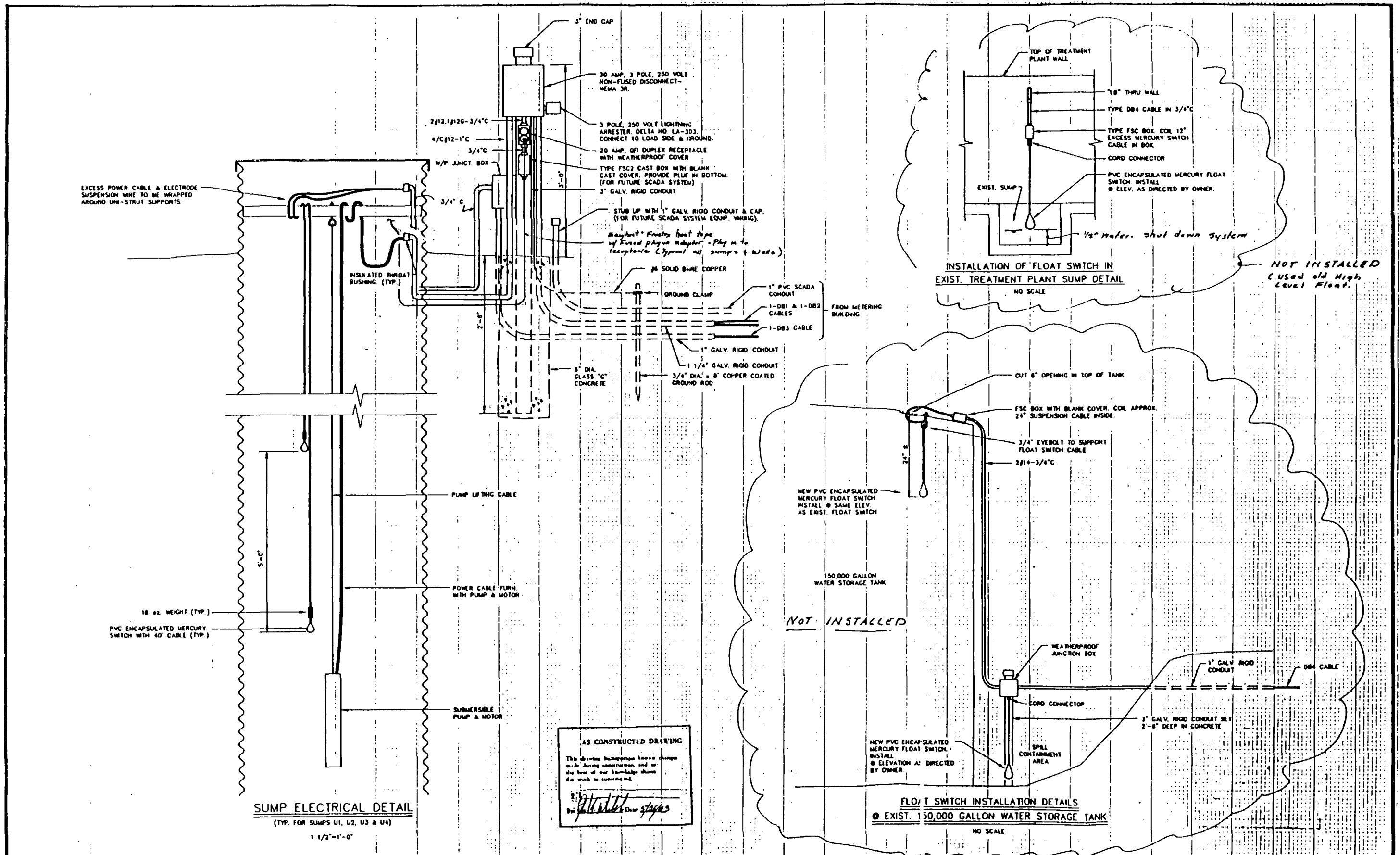
REVISIONS				APPROVALS				PROJECT		SHEET TITLE		SHEET E5	
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION	DESCRIPTION	DATE	BY	APP	SOUTHERN WOOD PIEDMONT CO. CHATTANOOGA PLANT SITE OIL AND WATER RECOVERY SYSTEM		WATER PUMP CONTROL PANEL CONTROL SCHEMATIC	
										SCALE NONE		DATE OCTOBER, 1982	
										FILE NO 8233823			



ITEM	DESCRIPTION
1CPT1	CONTROL POWER TRANSFORMER, 500 VA, 240 VOLT PRIMARY, 170V SECONDARY, WITH 2 PRIMARY FUSES & 1 SECONDARY FUSE, SQUARE D NO. WFS0001.
1CB	60 AMP, 2 POLE, 240 VOLT MAIN CIRCUIT BREAKER, SQUARE D NO. FAL22080.
1CR THRU SCR	GENERAL PURPOSE CONTROL RELAY, 120 VOLT COIL, DOUBLE POLE, DOUBLE THROW, ALLEN BRADLEY NO. 700-HA32A1 WITH NO. 700-HH100 SOCKET, MOUNT ON REQUIRED LENGTH OF NO. 189-DRI RAIL MOUNTING TRACK.
1TD THRU STD	ON DELAY TIMING RELAY, 120 VOLT COIL, DOUBLE POLE, DOUBLE THROW, ALLEN BRADLEY NO. 700-HH121A17 WITH NO. 700-HH100 SOCKET, MOUNT ON REQUIRED LENGTH OF NO. 189-DRI RAIL MOUNTING TRACK.
1M THRU SM	3 POLE MAGNETIC CONTACTOR, 12 AMP, 120 VOLT COIL WITH OVERLOAD RELAY & 2 NO. AUXILIARY CONTACTS, ALLEN BRADLEY NO. 100-A19D3-0-0, 183-85880 & NO. 183-FA111 AUXILIARY CONTACT BLOCK.
1MLS	SOLID STATE WATER LEVEL CONTROLLER, 120 VOLT WITH VARIABLE SENSITIVITY POTENTIOMETER, 8/W CONTROLS NO. 5200-LV2-0C.
1ETW THRU 5ETW	ELECTRONIC-OPERATED TIME METER, 7 DIGIT, LCD DISPLAY, FOR UP TO 999999.9 HOURS, REDUCTION NO. 7620-770.
1PDB	POWER DISTRIBUTION BLOCK, 3 POLE, COPPER, SQUARE D NO. LBC363108.

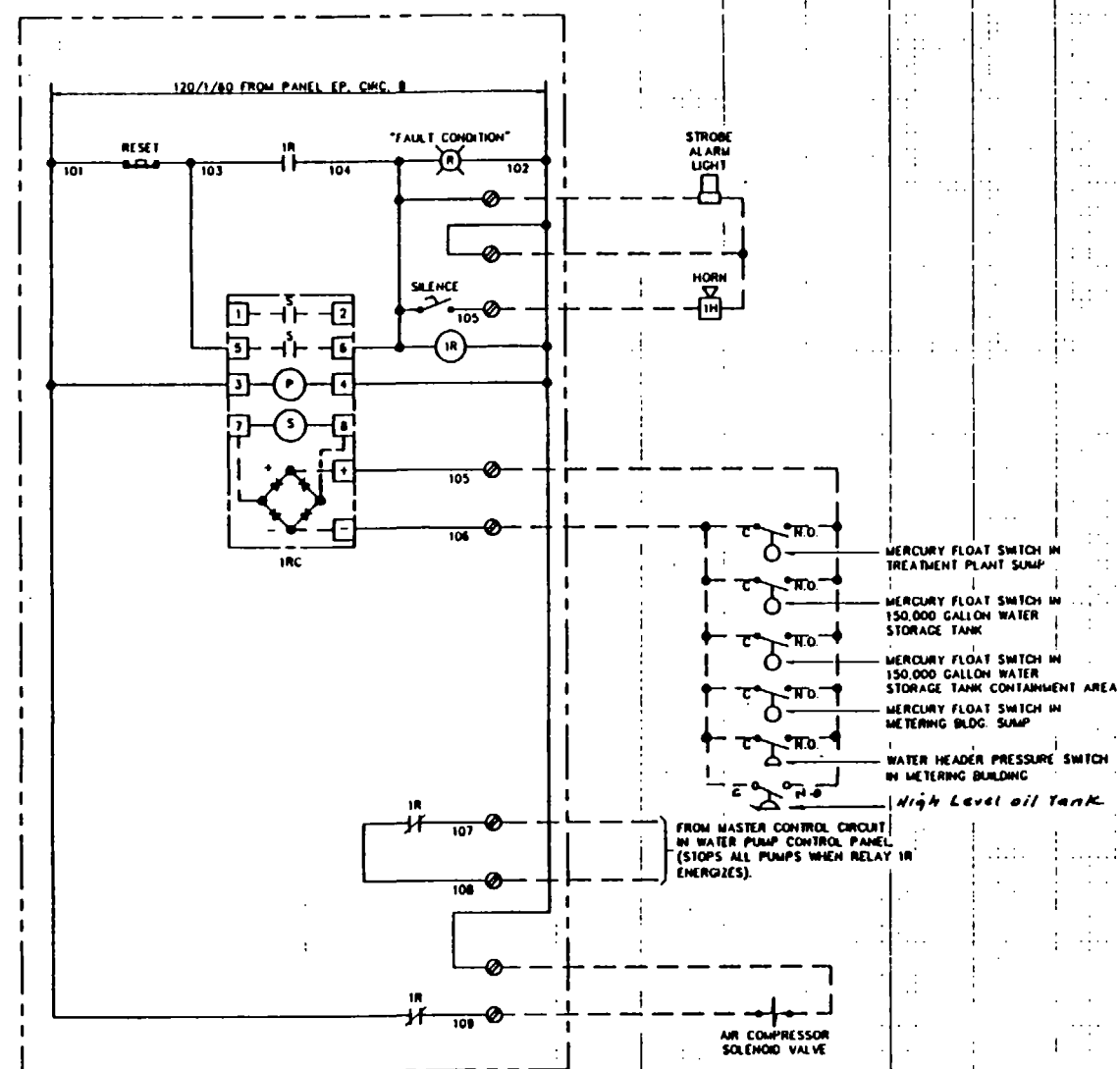
P. H. Altman 58403

SHEET E4  
OF 6  
REF. 92336  
N E NO :  
FILE NO  
027787

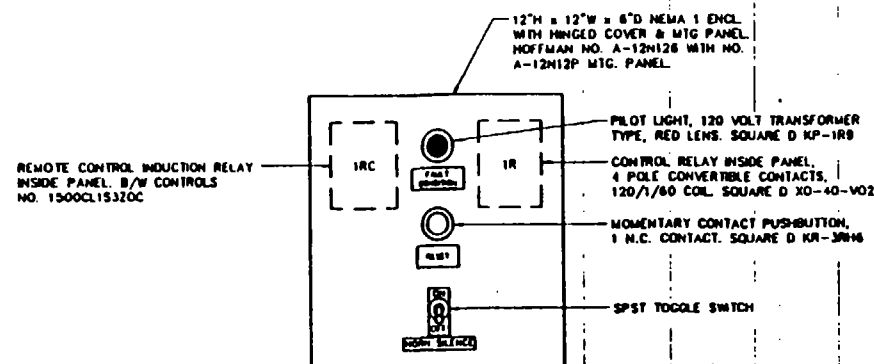


REVISIONS										APPROVALS		bpb	PROJECT		SHEET TITLE		SHEET E5	
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION	DESCRIPTION	DATE	BY	APP	PROJECT ENGR.	SEAL		SCUTHERN WOOD PIEDMONT CO.		ELECTRICAL DETAILS		OF 6	REF 92336
	Add float type	10/1/88	RFH	RFH						DESIGNED BY	RFH		CHATTANOOGA PLANT SITE				FILE NO	
	Rev. as Per As Builts	5/1/89	RFH	RFH						DRAWN BY	RSW		OIL AND WATER RECOVERY SYSTEM				DATE	
										CHECKED BY	RSW						AS NOTED	
										APPROVED BY	RSW						OCTOBER 1988	

**B. P. BARBER & ASSOCIATES, INC.**  
ENGINEERS • SURVEYORS • PLANNERS  
3401 EAST BLACK OAK ROAD  
SPARTANBURG, S.C. 29301  
803-576-9810

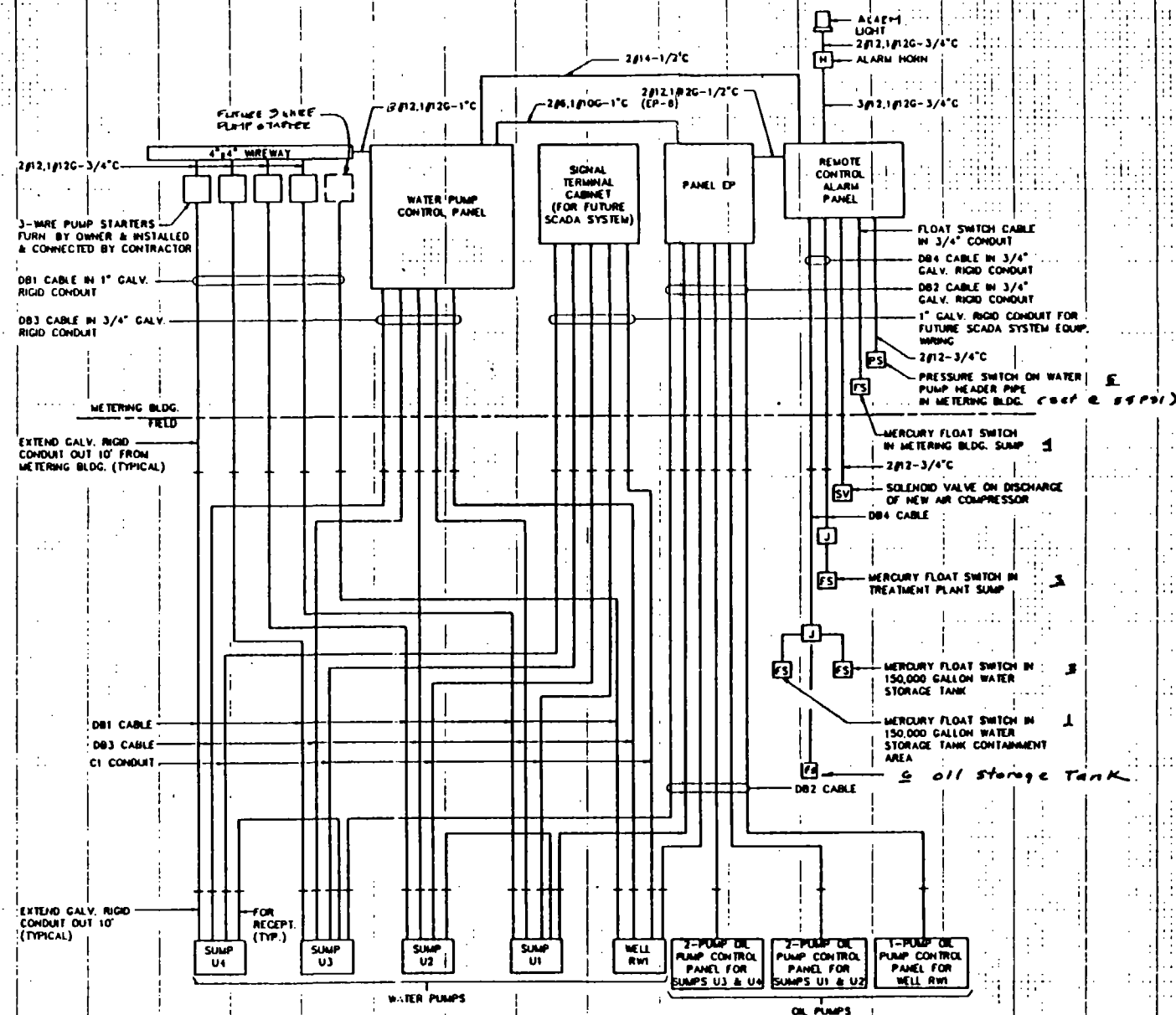


REMOTE CONTROL ALARM PANEL  
(LOCATED IN NEW METERING BUILDING)



REMOTE CONTROL ALARM PANEL  
(LOCATED IN NEW METERING BUILDING)  
NO SCALE

NOTE: FAULT CONDITION ALARM WILL OCCUR ON ONE OR MORE OF THE FOLLOWING CONDITIONS:  
1. HIGH LEVEL IN 150,000 GALLON WATER STORAGE TANK.  
2. HIGH LEVEL IN 150,000 GALLON WATER STORAGE TANK CONTAINMENT AREA.  
3. HIGH LEVEL IN METERING BLDG. SUMP.  
4. HIGH LEVEL IN TREATMENT PLANT SUMP.  
5. HIGH PRESSURE IN WATER PUMP HEADER PIPE.  
6. Oil Tank



WIRING SYSTEM INTERCONNECTION DIAGRAM

AS-CONSTRUCTED DRAWING  
This drawing incorporates known changes made during construction, and is the best of our knowledge shown the work as constructed.  
By *[Signature]* 1/24/83

LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION	DESCRIPTION	DATE	BY	APP
	General Revision	1/24/83	EL						

PROJECT ENGR	RSW
DESIGNED BY	RFH
DRAWN BY	RFH
CHECKED BY	RSW
APPROVED BY	RSW

PROJECT	SOUTHERN WOOD PIEDMONT CO. CHATTAHOOGA PLANT SITE OIL AND WATER RECOVERY SYSTEM
ENGINEERS • SURVEYORS • PLANNERS	
2410 EAST BLACK OAK ROAD	
SPARTANBURG, S.C. 29301	
803-876-3616	

SHEET	60
OF	6
REF.	U2338
NO.	NO
FILE	NO



**PART 1 - GENERAL**

### 1.1 DESCRIPTION

- ## 1.2 JOB CONDITIONS

**A. Existing Utilities.**

- 8 Clearing:**

- C. Restoration of disturbed areas:

- D. Minimizing silt and bank erosion during construction.

- PART 2 - PRODUCTS**

## 2.1 EXCAVATED MATERIALS

- ## 2.2 BACKFILL MATERIAL

2. Do not permit rocks larger than 2 inches in greatest dimension in top 6 inches of backfill

## 2.3 OTHER MATERIALS

- PART 3 - EXECUTION**

### 3.1 PROCEDURES

- A. Existing Utilities:

- #### B. Protection of persons and property

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operation under this Section.

C. <sup>i</sup> Douglaring:

- ## 3.2 TRENCH EXCAVATION (Unclassified)

- A. Remove all materials of unknown substance encased

**Open End:**

1. Excavate for utilities and trenches by open cut unless otherwise indicated.

2. Remove boulders and other interfering objects, and backfill voids left by such removals, at no additional cost to the Owner.

- C. Trench to the minimum width as shown on the drawings with sides as nearly vertical as possible.
- D. Provide sheeting and shoring necessary for protection of the work, for the safety of personnel, and for the protection of adjacent structures and roadway surfaces.

### 3.3 BACKFILLING

- A General:**

1. Backfill trenches and excavations immediately after the pipes and electrical lines are laid, unless other protection is directed or indicated.

2. Select and deposit backfill materials with special reference to the future safety of the pipes and electrical lines. Utilize borrow material only as required by the Owner, due to contamination or unsuitable trench excavation material.

3. Reopen trenches which have been improperly backfilled, to a depth as required for proper compaction. Refill and compact as specified, or otherwise correct to the approval of the Owner.

4. Surplus material shall be disposed of as directed by the Owner.

5. Original surface shall be restored to the approval of the Owner.

6. Provide tracing wire in all trenches as specified on the drawings.

8. Backfill Procedure: Backfill the trenches in the following order:

- Backfill piping to a depth of 6-inches over the pipe and hand tamp around and under the haunch of the pipe to "set" in the piping and prevent lateral movement. Minimum compaction shall be 93% (standard proctor).

2. Backfill the remainder of the ditch to a level 1.5 feet below finish grade and compact as follows:

- a. Grassed and non-traffic areas - 90% (standard practice)
- b. Driveways, roads, and areas adjacent to structures - 95% (standard practice).

3. Place filter fabric (Mylar 1100N) over the backfill and then place electric conduit and air piping on the filter fabric. Backfill an additional 12-inches with compaction as specified in 3.38.2.

- A. Place a #12 insulated copper tracing wire 8-inches below finished grade in the center of the trench and complete backfill with compaction as specified in 3.082.

## CONCRETE

01. All concrete shall be in accordance with the latest editions of the American Concrete Institute (ACI) Standard Codes of Practice.

Within 14 calendar days after receiving Owner's Notice to Proceed, submit proposed mix designs for approval.

AS CONSTRUCTED DRAWING

The drawing immediately before hanging  
on the living room wall, and as  
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the man is established.

PLOT SCALE:				REVISIONS				APPROVALS				SEAL		PROJECT		SHEET TITLE		SHEET							
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION	DESCRIPTION	DATE	BY	APP	PROJECT ENGR	RSW			SOUTHERN WOOD PIEDMONT CO. CHATTANOOGA PLANT SITE OIL AND WATER RECOVERY SYSTEM		TECHNICAL SPECIFICATIONS		SHEET	S-2						
	GENERAL REVISIONS	10/24/92	EN	EN						DESIGNED BY	RSW			OF		REF.	92336								
										DRAWN BY	CCK														
										CHECKED BY	RSW														
										APPROVED BY	RSW														
														B. P. BARBER & ASSOCIATES, INC. ENGINEERS - SURVEYORS - PLANNERS 1340 EAST BLACKSTOCK ROAD SPARTANBURG, S.C. 29301 803-578-0810				NO SCALE		DATE		OCTOBER, 1992		FILE NO 92336SP2	

- A. Install pumps in sumps and wells complying with Contract Documents
- B. Install sensor cable and attach to pump tubing and supports using plastic tie wraps. Provide army type quick disconnect for all sensor and electrical wiring
- C. Install pump and piping, plumbing assembly for proper alignment and fit
- D. Install power cables using the cable strain reliefs and cord grips
- F. Install all air tubing using quick disconnect type fittings

- A. Extend grounding wire from control panel main ground screw to external ground as indicated and complying with NEC and local electrical codes.
- B. Make meter lead, sensor cables, and power supply connections.
- C. Seal all conduits between junction box and control panel, complying with all pertinent National Electrical Code requirements. All connections are to be water tight.
- D. Use licensed personnel as required by local regulations.

- A. Provide the following inspections and tests on each pump before shipment from factory by the manufacturer:
  1. Check impeller, motor rating and electrical connections for compliance to the customer's purchase order.
  2. Make a motor and cable insulation test for moisture content of insulation defects.
  3. The pump shall be run to establish correct rotation and mechanical integrity.
  4. Run the pump for 30 minutes submerged, a minimum of 6 1/2 feet under water.
  5. After operational test No. 4, perform the insulation test (No. 2) again.
  6. Supply a written report stating the foregoing steps have been done with each pump at the time of shipment.
- B. Provide the following tests after installation:
  1. Operate pumps utilizing manual and automatic modes, demonstrating proper operational sequences.

- A. **Work Included:** Provide piping, valves, and fittings for the pressure piping and gravity drains as required for a complete and properly operating system.
- B. **Quality Assurance:**
  1. Provide all piping in accordance with referenced standards and specifications.
- C. **Submittals:**
  1. Provide shop drawings of all piping to be used on the job.

2.1 DOUBLE WALL PIPE - FORCE MAIN (PE 3408 EXTRA HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE) Drisco Pipe Series 8600 or approved equal.

- A. Reference manufacturer shall be Phillips Drisco Pipe, Inc.
  1. Inner and outer pipe shall be butt fused polyethylene.
- B. Double wall pipe shall consist of an outer casing pipe with an unsupported inner carrier pipe. All pipe sizes to be based on nominal I.D. dimension.
  1. Inner carrier pipe shall be as follows:
    - 1/2" - SDR 11, 160 psi
    - 3/4" - SDR 11, 160 psi
    - 1-1/2" - SDR 11, 160 psi
  2. Outer pipe shall be as follows:
    - 1-1/2" - SDR 11, 160 psi
    - 2" - SDR 15.5, 110 psi
    - 3" - SDR 18, 89 psi
- C. Galvanized iron piping at pump and junction manholes shall be Schedule 40
- D. Ductile iron pipe at junction manholes shall be minimum Class 50.
- E. Copper sensing lines shall be Type K.

- A. Transition fittings shall be provided to transition from the polyethylene inner F.M. piping to standard ANSI 125 lb. flanges and IPS threaded fittings.
- B. DIP flanged fittings shall be in accordance with ANSI standards.
- C. DIP fittings shall be Schedule 40, threaded for IPS.

A. Gate valves and ball valves shall be all bronze threaded (PS) with minimum of 150 psi working pressure.

B. Check valves shall be spring loaded, in-line design, all bronze threaded (PS) with 150 psi minimum working pressure and TFE disc and seat.

C. Globe valves shall be all bronze threaded (PS) with minimum of 150 psi working pressure.

2.4 Water meters shall be all bronze in the sizes shown on the drawings and shall have direct reading registered in gallons. All wetted parts shall be resistant to creosote.

A.  $\frac{3}{4}$ -inch meters are Sensus, Model SR-2.

A. All piping shall be laid as shown on the drawings. Grade may vary but must maintain continuous down grade drainage. All piping in wall heads, manholes, central building and sump pump stations shall be leak free, plumb, and properly inspected.

A. All inner carrier pipe and pressure piping and fittings shall be tested to a minimum pressure of 100 psi without leakage or failure. All outer containment piping shall be pressure tested to 5 to 10 psi without leakage or failure. The test pressure must be held for a period of 2 hours without a drop in pressure. All testing must be witnessed and certified by Omer.

1.1 DESCRIPTION

A. Work included. Provide and install equipment, appurtenant equipment, piping, controls, and accessories as needed to provide a complete and properly operating system.

1. Compressor equipment and controls are to be furnished by the Contractor.
2. Provide one (1) compressed air system with each consisting of a tank mounted reciprocating air compressor, after cooler, moisture separator/prefilter, oil removed filter, 3 heatless desiccant air dryers, and particulate filter.

A. Referenced equipment manufacturers are as follows:

1. Air compressors: QUINCY, QUINCY COMPRESSOR CO., QUINCY, ILLINOISE 62305
2. Desiccant Air Dryers: ARROW Compact Desiccant Dryers

NOTE: Referenced manufacturers are named to establish standards of quality. Equal products of other manufacturers may be provided with approval of the Owner and Engineer prior to bid.

B. Technical services:

1. Provide a service engineer, complying with the requirements of the technical services section of these specifications for the following periods of time:

A. Provide 3 sets of shop drawings and 3 sets of O&M manuals for each model and piece of equipment associated with the compressed air system.

Building No.	Model	Horsepower	Receiver Capacity	Required (cfm)	Discharge Pressure
Shop	Pumy PR-25/34A	7-1/2	120 Gallons	30	150 psi

B. The air compressor shall be two stage and provided with the following features as a minimum:

1. Heavy duty, cast iron, pressure lubricated reciprocating design compressor pump. Lubrication shall be by synthetic oil.
2. Totally enclosed belt guard and all other OSHA safety devices.
3. Inlet air filter.
4. Belt guard aftercooler.
5. Air receivers shall be ASME pressure rated with 150 psig pressure relief valve.
6. Dual control system - auto start/stop or constant run with load/Control to be from an air pressure switch on the
7. Magnetic motor starter with thermal overcurrent.
8. All motors shall be 460 volt, 3 phase, 60 cycle, and open drip-proof, industrial duty.
9. Compressor shall be belt driven with a 1.5 service factor on the belt drive design.
10. Air receivers shall be equipped with electrically timed automatic pressureless drain valves. (675000 and 1/2 inch)
11. Oil pressure shutdown switch.
12. One (1) change of air filter elements.
13. Five gallons of synthetic oil.

A. Desiccant Air Dryer Model:

1.	Location	Model
	Amman, Syria	Arrow D 254 G. (15,000 SCF)
	U/U-2	Arrow DIO-O-XI (5000 SCF)
	U/U-4	
	EW-1	

B. The ~~Arrow DIO-O-XI~~ shall be activated during desiccant for a 40 degree Fahrenheit dew point and provided with the following features as a minimum:

1. Moisture separator/prefilter, 3 micron absolute.
2. Oil removed filter, 0.025 micron absolute.
3. Particulate afterfilter, 1 micron absolute.
4. Dual towers, one to be regenerating while the other is drying. Both towers shall be ASME pressure rated and equipped with safety relief valves.
5. Complete control system to automatically switch the operation of the towers. Power failure shall constitute the opening of all valves allowing the available air to be dried until power can be restored.
6. Electrically timed automatic drain valve with T strainer on the separator/prefilter.
7. Inlet temperature 100o F.
8. Maximum inlet pressure - 125 psig
9. Dew Point - 40o F at 125 psig
10. Purge flow rate - 3.7 gpm
11. Electrical power requirements - 115V, 1Ø
12. Inlet and outlet connection - 1/2" NPT
13. Purge flow indicator setting - 18 psig

~~Delete~~

3.1 GENERAL

- A. All components of the compressed air system shall be installed in strict accordance with the manufacturer's recommendations.
- B. Install all equipment on concrete pads anchored in accordance with manufacturer's requirements.

3.2 SERVICE

- A. Provide three (3) copies of complete O&M Manual
- B. Provide 1 day, 1 trip of qualified service representative to start-up the equipment and place it in operation.

1.1 DESCRIPTION

A. Work Included: Provide grading of the areas specified herein, or as indicated, for a complete and proper installation.

1. All disturbed areas disturbed during construction.

A. Seed. Conform to all local and State laws and regulations.

A. Provide commercial balanced 10-10-10 fertilizer delivered to the site in bags labeled with the manufacturer's guaranteed analysis.

A. Provide grain seed which is:

1. free from noxious weed seeds, and reclaimed.
2. Grade A recent crop seed.
3. Treated with appropriate fungicide at time of mixing.
4. Delivered to the site in sealed containers with dealer's guaranteed analysis.

A. Provide sector non-loan to animals and humans

### 3.1 GROUND PREPARATION

- Bring all areas to proper line, grade and cross section indicated on the plans.
- Repair erosion damage prior to commencing seeding operations.
- Loosen seed bed to minimum depth of 3 inches.
- Remove all roots, clods, stones larger than 2 inches in any dimension, and other debris.

A. Spread uniformly over areas to be seeded at:

1. Rate of 750 lbs. per acre when using 10-10-10

B. Mix with soil to depth of approximately 3 inches.

- B. General:
  - 1. Perform seeding during warm months of year (April-July) unless winter schedule is used.
  - 2. Do not conduct stand of grass regardless of period of the year the work is performed.
  - 3. Produce satisfactory stand of grass regardless of period of the year the work is performed.
- C. Seeding:
  - 1. Provide bermuda and apply at a rate of 200 lbs./acre.
- D. Winter Planting Schedule:
  - 1. Performed during the months of the year (August-February).
  - 2. Provide annual ryegrass and apply at a rate of 4 lbs. per 1000 square feet.

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the best of our knowledge shows  
the work is constructed.

SWP assumes responsibility for the design concept and installation of the process or installation shown in these drawings. S.P. Barber is responsible for the engineering design which converts the design concept into these drawings.

[illegible]

## ELECTRICAL

## PART 1 - GENERAL

## 1.1 DESCRIPTION

- A. Work included: Provide a complete electrical system as indicated on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:

1. Distribution equipment.
2. Branch circuit wiring conductors and direct burial cable.
3. Conduit systems.
4. Lighting fixtures and lamps.
5. Miscellaneous control devices as shown on plans.
6. Other items and services required to complete the systems whether particularly mentioned or not.

## B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

## 1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

## 1.3 SUBMITTALS

- A. Comply with the requirements previously specified herein for shop drawing submittals.
- B. Product data: Within 15 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section.
  2. Manufacturer's specifications, other data and shop drawings needed to prove compliance with the specified requirements. Drawings for approval shall include:
    - a. Distribution equipment.
    - b. Conduit and fittings.
    - c. Conductors.
    - d. Direct burial cable.
    - e. Miscellaneous control devices.
  3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the work.

## 1.4 PRODUCT HANDLING

- A. Comply with the requirements previously specified herein.

## 1.5 WARRANTY

- A. Provide one year warranty on all labor and materials.

## 1.6 RULES AND PERMITS

- A. The entire installation shall be in accordance with the latest edition of the National Electrical Code, Occupational Safety and Health Act, and all local codes.
- B. Apply and pay for all permits and inspections required by local or state laws.
- C. Furnish the Owner with certificate of inspection and final approval from all authorities having jurisdiction.

## 1.7 DRAWINGS

- A. The drawings and specifications are complementary to each other and what is called for by one shall be as binding as if called for by both. The drawings are diagrammatic and are to be followed as closely as the construction will permit.
- B. The drawings show the general location of circuit arrangement. Because of the small scale of the drawings, it is not possible to indicate all of the detail involved. The Contractor shall carefully investigate the conditions affecting all his work and shall arrange such work accordingly, furnishing such fittings and accessories as may be required to meet such conditions.

## PART 2 - PRODUCTS

## 2.1 GENERAL

- A. Provide only materials that are new, of the type and quality specified. Where Underwriters Laboratories, Inc. have established standards for such materials, provide only materials bearing the UL label. Materials called for are to be considered as standard which, however, implies no right on the part of the Contractor to substitute other materials and methods without written authority from the Engineer. Requests for substitution for specified equipment, materials, or service shall be submitted to the Engineer not less than 72 hours prior to opening of bids.

## 2.2 RACEWAYS

- A. Metallic raceways shall be full weight hot dipped galvanized rigid steel.
1. Couplings for rigid steel conduit shall be standard electric conduit couplings, and no pipe couplings or sleeves shall be used. Fittings shall be full weight galvanized.
  2. Conduit straps, hangers and accessories shall be heavy-weight hot dipped galvanized.
- B. Non-metallic conduit shall be Schedule 40, heavy wall PVC.
1. PVC conduit may only be installed underground. Where the conduit extends into a building, structure, panel, etc., transition shall be made to rigid steel elbows and vertical risers.

## 2.3 CONDUCTORS

- A. Single power and lighting conductors shall be 600 volt, 75 degrees C, Type THW, stranded copper.
- B. Control conductors shall be 600 volt, 75 degrees C, type THWN. Control conductors in control panels shall be Type TW, stranded copper.
- C. Direct Burial Cables:
1. Power cables shall be 3-wire conductors of the sizes as noted on the plans, with grounding conductor, 75 degrees C, Class B stranded copper with XLP crosslinked polyethylene insulation and surface print phase identification. Insulated conductors shall be twisted with a Class B stranded copper grounding conductor and wires in each volley, wrapped with cable tape and an overall PVC jacket.
  2. Remote control cable shall be two-conductor No. 14 gauge, 18 strands copper, 75 degrees C, each conductor with PVC insulation, nylon jacket and an overall PVC jacket, suitable for direct burial.

## 2.4 GROUNDING

- A. Bushings for conduits 1" or larger shall be grounding type. Bond to ground bar or lug of enclosure.
- B. Ground rods shall be 3/4" dia. x 8' copper-coated.

## 2.5 PANELBOARDS

- A. Panel shall be circuit breaker type as manufactured by Square D or approved equal.
- B. Lugs shall be in top or bottom for the number of wires and wire sizes as indicated on the drawings.
- C. Breakers shall be bolt-in type and be numbered as indicated on the drawings.

## 2.6 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

## 2.7 MISCELLANEOUS MATERIALS

- A. Support framing and channel shall be aluminum or stainless steel as manufactured by Unistrut, Kindorf, or equal.
- B. All attachment hardware shall be stainless steel (bolts, nuts, washers, U-bolts, etc.).

## AS CONSTRUCTED DRAWING

This drawing incorporates changes made during construction, and is the basis of our knowledge of the work as constructed.

By *[Signature]* Date *5/12/83*

## PART 3 - EXECUTION

## 3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

## 3.2 PREPARATION

- A. Coordination:
1. Coordinate as necessary with other trades to assure proper and adequate provision in the work of these trades for interface with the work of this Section.
  2. Coordinate the installation of electrical items with the schedule for work of other trades to prevent unnecessary delays in the total work.
- B. Data indicated on the Drawings and in these Specifications are as exact as could be secured, but their absolute accuracy is not warranted. The exact locations, distances, levels, and other conditions will be governed by actual construction and the Drawings and Specifications should be used only for guidance in such regard.

## 3.3 TRENCHING AND BACKFILLING

- A. Perform trenching and backfilling associated with the work of this Section in strict accordance with the provisions previously set forth.

## 3.4 COLOR CODE AND MARKERS

- A. All conductors in the 120/240 volt, 3 wire, 60 Hertz system shall have Phase "A" - black; Phase "B" - red; and the neutral wire white. All equipment grounding conductors shall be green.
- B. All 240 volt equipment shall be marked "DANGER - 240 VOLTS" by means of red laminated plastic nameplates having one-half inch (1/2") engraved lettering. Attach plate to equipment with stainless steel screws.
- C. Mark wires within panelboards with self-sticking label bearing the number corresponding to the circuit number on the drawings. Connect these wires to corresponding breaker in panel.
- D. Mark equipment, panelboards, cabinets, control devices, etc. by means of black, white core laminated nameplates having 1/4" engraved lettering. Description shall conform to designations on the drawings. Attach plates to equipment with stainless steel screws.

## 3.5 SPLICES AND CONNECTIONS IN WIRES AND CABLES

- A. Low voltage (600 volts and below) conductors shall be joined securely both mechanically and electrically. Wires No. 8 and smaller shall be soldered and insulated with heat shrink and plastic electrical tape to provide insulation equal to the original conductor (approved pressure type mechanical connectors may be used). Wire No. 8 and larger shall be connected with compression type solderless connectors and insulated with heat shrink and plastic electrical tape to provide insulation equal to the original conductor.

## 3.6 RACEWAYS AND FITTINGS

- A. All wiring shall be in raceways run concealed unless otherwise noted on drawings. Securely and rigidly support raceways at all boxes, outlets and turns, and not over 8 feet on centers.
- B. Exposed raceways shall be installed either parallel or perpendicular to building walls. Raceways exposed on walls shall be perpendicular to the floor.
- C. Room raceways in place and protect where necessary to prevent damage during construction. Plug ends of raceways to avoid filling with plaster, mortar or concrete.
- D. Secure raceways in place and protect where necessary to prevent damage during construction. Plug ends of raceways to avoid filling with plaster, mortar or concrete.
- E. In general, the raceway installation shall follow layout shown on the plans. However, this layout is diagrammatic only, and where changes are necessary due to structural conditions, other apparatus or other causes, such changes shall be made without any additional cost to the Owner. Offsets in conduits are not indicated and must be furnished as required.
- F. Tables 3A and 3B of the National Electrical Code shall apply unless larger raceways are specified.
- G. Metal conduit installed in contact with the earth shall be protected by brush application of two coats of hot pitch or other approved non-petroleum preservative. Seal all joints.
- H. All raceways underground and exterior to the building shall be installed a minimum of 24" below grade unless otherwise noted.

- I. Provide necessary sleeves and chases where conduits pass through floors and walls, and provide other necessary openings and spaces, arranging for in proper time to prevent unnecessary cutting in connection with the work. Perform cutting and patching in accordance with the provisions for the original work.

- J. Seal all underground conduits at electrical equipment with duct seal.

## 3.7 GROUNDING

- A. Particular attention is directed to Article No. 250 of the National Electrical Code. The electrical system and motors shall be grounded and bonded in accordance with this article.
- B. Bond ground lug of each receptacle to outlet box with green jumper wire.
- C. Install electric bond around panels, cabinets, pull boxes, enclosures, etc. to incoming and outgoing subfeed raceways by use of grounding type bushings.
- D. Install ground from service to driven ground rod (maximum resistance shall measure 25 ohms).

## 3.8 UNIT RESPONSIBILITY

- A. Panelboards, relays, etc. furnished under this Section of the specifications shall be supplied by the same manufacturer so as to give unit responsibility and ease of maintenance.

## 3.9 TESTING AND INSPECTION

- A. Provide personnel and equipment, make required tests, and secure required approvals from the Engineer and governmental agencies having jurisdiction.
- B. Make written notice to the Engineer adequately in advance of each of the following stages of construction:
1. When all rough-in is complete, but not covered.
  2. At completion of the work of this Section.
- C. When material and/or workmanship is found to not comply with the specified requirements, within three days after receipt of notice of such non-compliance remove the non-complying items from the job site and replace them with items complying with the specified requirements, all at no additional cost to the Owner.

## 3.10 CLEANING AND PAINTING

- A. On completion of the electrical work, all debris, scraps and other waste material left by this Contractor shall be collected and removed from the premises. All trench work shall be well tamped, leveled and excess dirt and debris removed to site dump, when and as directed by the Engineer. All electrical equipment, exposed conduit, enclosures and boxes shall be thoroughly cleaned of all foreign materials and painted in accordance with the requirements previously set forth.

## 3.11 ELECTRIC EQUIPMENT BY OTHERS

- A. All motors for equipment shall be furnished by the equipment manufacturer. This Contractor shall verify voltage, extent, type, etc. of this and all other such electrical equipment. Before connecting to any piece of such equipment, check the nameplate data against the information shown on the drawings and call to the immediate attention of the Engineer any discrepancies discovered.

## 3.12 PROJECT COMPLETION

- A. Test all service and feeder wiring using an instrument which applies a voltage of approximately 500 volts DC to provide a direct reading of resistance.
- B. Map grounding systems to measure ground resistance, and provide not more than 25 ohms resistance, adding ground rods as necessary to achieve that level.
- C. All tests shall be conducted in presence of Engineer or his representatives. All resulting readings shall be recorded, properly identified and submitted to Engineer for acceptance.
- D. Measure voltages as directed by the Engineer and report to him these values.
- E. Entire system shall be free from all shorts and grounds, equipment bonded and grounded in full compliance with local and national codes. Test system in the presence of the Engineer and operate to his complete satisfaction in accordance with true intent of plans and specifications. Defer cost of all adjustments necessary to bring system up to standards set forth by Contract Documents at no additional cost.

SUP assumes responsibility for the design concept and installation of the process or installation shown in these drawings. B.P. Barber is responsible for the engineering design which converts the design concept into these drawings.

BY SCALE

## REVISIONS

NO.	DESCRIPTION	DATE	BY	APP.	LOCATION	DESCRIPTION	DATE	BY	APP.
1	GENERAL REVISIONS	5/12/83	RSW	RSW					
2									
3									
4									

## APPROVALS

PROJECT ENGR	RSW
DESIGNED BY	RSW
DRAWN BY	CCK
CHECKED BY	RSW
APPROVED BY	RSW



B. P. BARBER & ASSOCIATES, INC.  
ENGINEERS • SURVEYORS • PLANNERS  
240 EAST BLACKSTOCK ROAD  
SPARTANBURG, S.C. 29301  
803-576-0010

## PROJECT

SOUTHERN WOOD PIEDMONT CO.  
CHATTANOOGA PLANT SITE  
OIL AND WATER RECOVERY SYSTEM

## SHEET TITLE

TECHNICAL SPECIFICATIONS

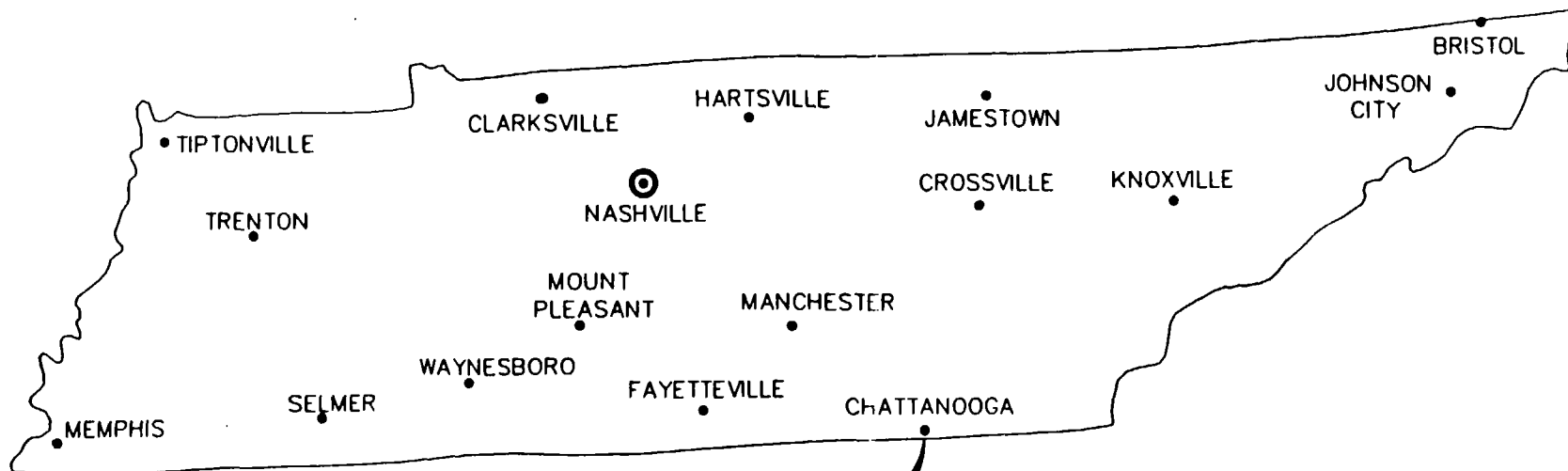
SHEET S-4

OF

REV 02336

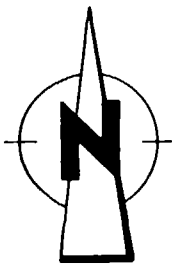
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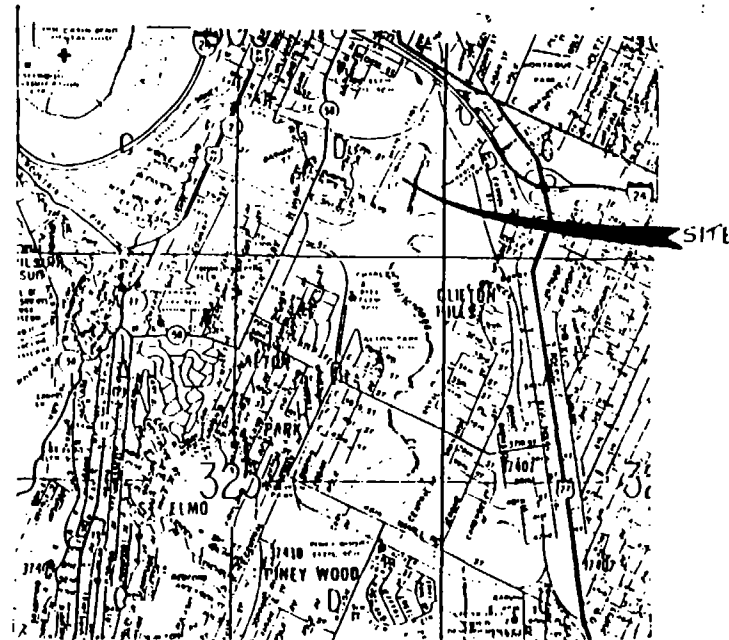


PROJECT LOCATION

# SOUTHERN WOOD PIEDMONT CORP. SPARTANBURG, S. C. CHATTANOOGA, TENNESSEE PLANT GROUND WATER & OIL RECOVERY PUMPING SYSTEM



0 25 50 100 125  
SCALE IN MILES



VICINITY MAP

## INDEX

TITLE	DWG. NO.
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LOWER GROUND WATER RECOVERY TRENCH	5
LOWER TRENCH DETAILS	6
LOWER TRENCH SUMP DETAILS	7
TECHNICAL SPECIFICATIONS	8,9,10

*[Signature]*

**B.P. BARBER & ASSOCIATES, INC.**  
ENGINEERS ~ SURVEYORS ~ PLANNERS

351-C BLACKSTOCK RD  
SPARTANBURG, S.C. 29301  
(803) 576-6610

2611 FOREST DRIVE  
P.O. BOX 1116  
COLUMBIA, S.C. 29202  
(803) 254-4400

7410 NORTHSIDE DRIVE  
NORTH CHARLESTON, S.C. 29418  
(803) 553-9595

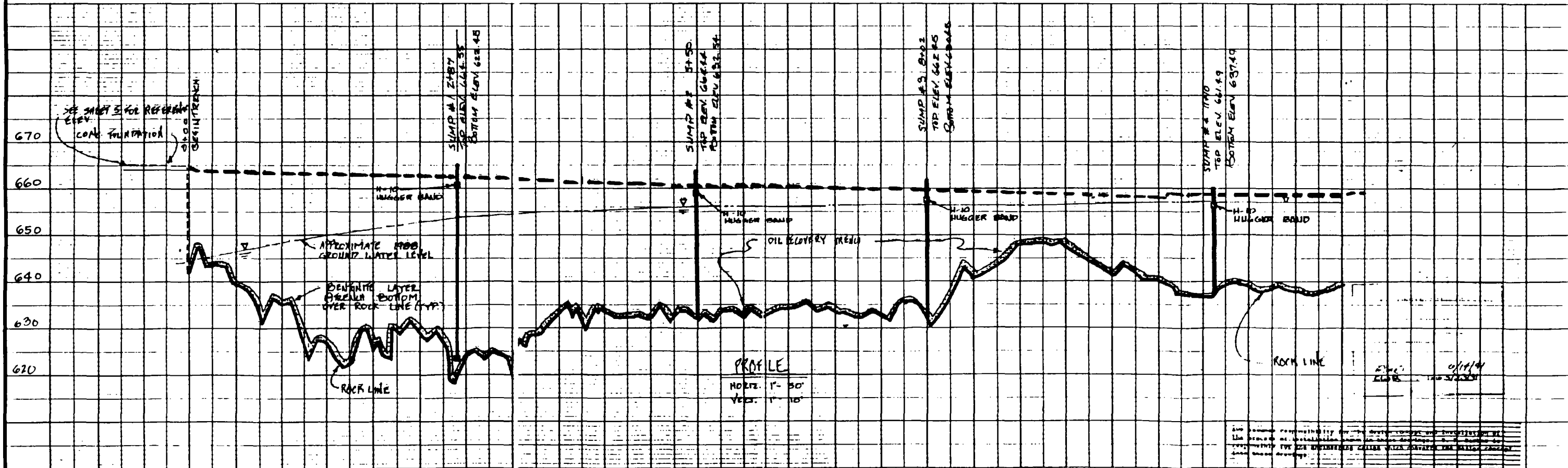
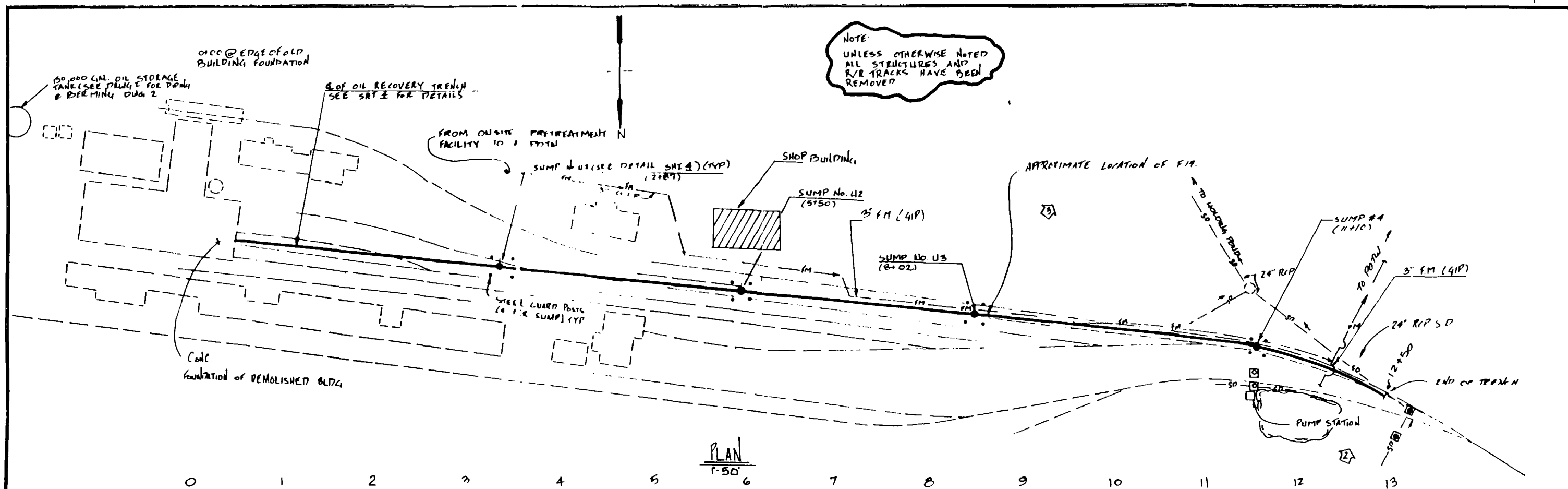


PROJECT NO.: 89648

DATE: JAN., 1990

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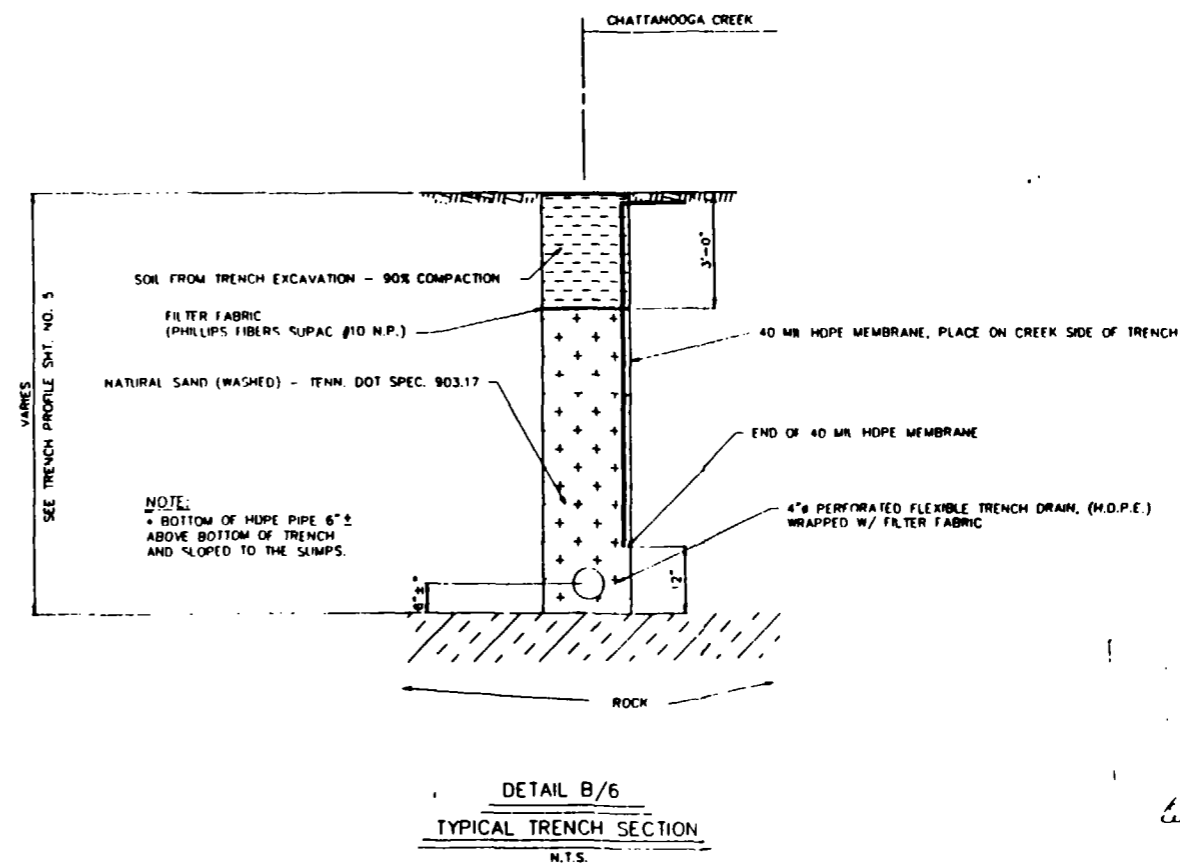
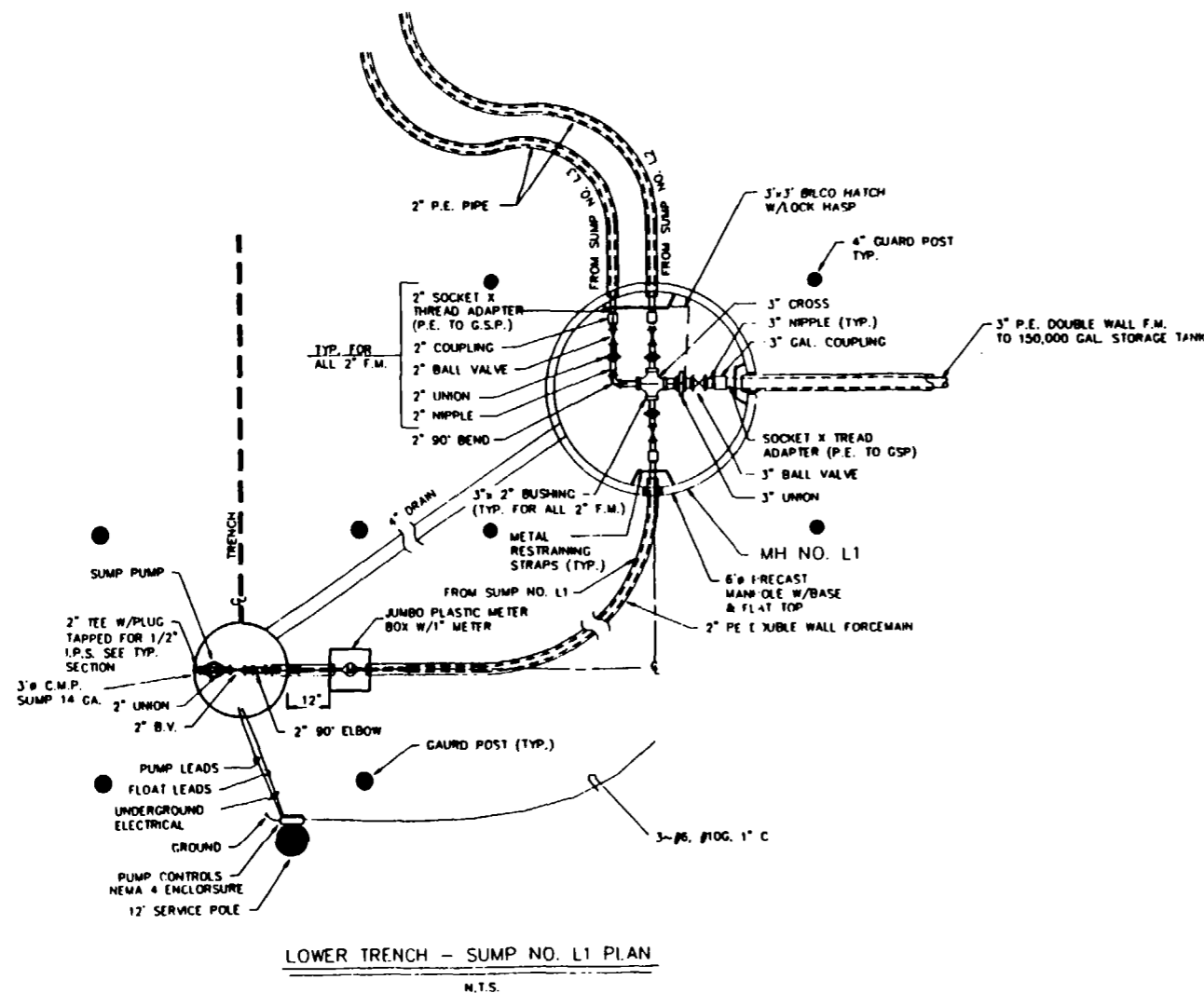
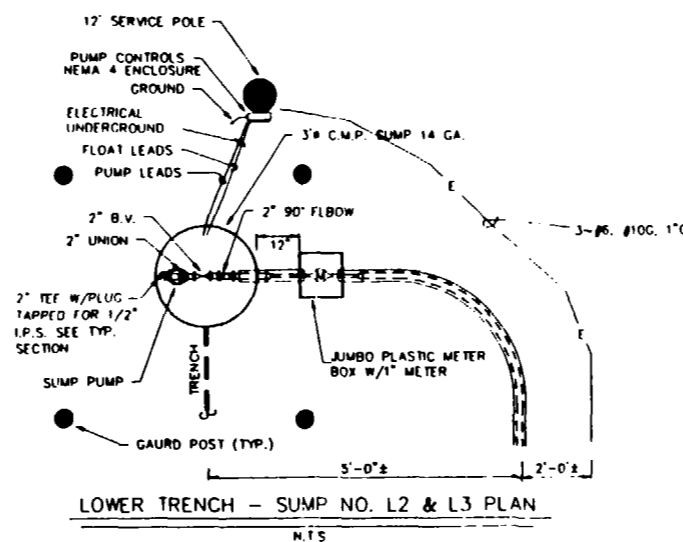




REVISIONS					APPROVALS					PROJECT		SHEET TITLE		SHEET 3 OF 10	
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION	DESCRIPTION	DATE	BY	APP	PROJECT	DESCRIPTION	SHEET TITLE	DESCRIPTION	DESCRIPTION	DESCRIPTION
1	GENERAL REVISION	2/7/84	RSV		1	DESIGNED BY		RSV		SOUTHERN WOOD PIEDMONT CORP. SPARTANBURG, S.C. CHATTANOOGA, TENNESSEE PLANT GROUND WATER PUMPING SYSTEM AND OIL RECOVERY SYSTEM		UPPER OIL RECOVERY TRENCH		REF 8064B	
2	ADD STORM DRAIN	3/3/85	RSV		2	DRAWN BY		RSV							
3	REVISED FORCE MAIN	3/3/85	RSV		3	CHECKED BY		HKO							
4	ADDED NOTE	3/3/85	RSV		4	APPROVED BY		RSV							
5	REVISED PROFILE	6/24/91	RSV							B. P. BARBER & ASSOCIATES, INC. ENGINEERS • SURVEYORS • PLANNERS 301 BLACKSTOCK ROAD SPARTANBURG, S.C. 29301 803-579-0010		SCALE AS NOTED		DATE JAN. 1990	

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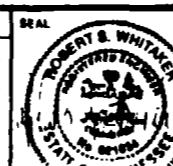




SWY assumes responsibility for the design concept and installation of the project as installation shown in these drawings. B. P. Barber is responsible for the engineering design which converts the design concept into these drawings.

REVISIONS							
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION	DESCRIPTION	DATE

APPROVALS			
PROJECT	BY	DATE	APP
DESIGNED	BY	DATE	APP
DRAWN	BY	DATE	APP
CHECKED	BY	DATE	APP
APPROVED	BY	DATE	APP



**B. P. BARBER & ASSOCIATES, INC.**  
ENGINEERS • SURVEYORS • PLANNERS  
340 EAST BLACKSTOCK ROAD  
SPARTANBURG, S.C. 29301  
803-578-0010

**PROJECT**  
SOUTHERN WOOD PIEDMONT CORP.  
SPARTANBURG, S.C.  
CHATTANOOGA, TENNESSEE PLANT  
GROUND WATER PUMPING SYSTEM  
AND OIL RECOVERY SYSTEM

SHEET TITLE		SHEET
LOWER TRENCH DETAILS		10
SCALE: AS NOTED		DATE: JAN. 1990
DRAWN BY: [Signature]		CHECKED BY: [Signature]







A 1-inch meters are to be SR11 with stringers

A. Sumps shall be 14 gauge 36 inch perforated corrugated metal pipe (c.m.p.), aluminumized type 2, with 3/32 inch diameter holes as manufactured by Contech Construction Products Division at their Conyers, Ga manufacturing plant.

- 1 The top portion of the sump shall be non perforated 14 gauge aluminumized type 2 corrugated metal pipe (c.m.p).
- 2 Sections of c.m.p. shall be joined together with a type H-10 hugger band with rods and nuts.

- A. All piping shall be laid as shown on the drawings. Grade may vary but must maintain continuous down grade drainage.
- B. Polypropylene piping shall be butt fusion welded at all joints to provide a water tight joint.
- C. Trench drain pipe shall be jointed by couplings per manufacturer's recommendations.
- D. Sumps are to be installed plumb with a lockable lid with vent provided as shown on the drawings.

A All inner force main pressure piping and fittings shall be tested to a minimum pressure of 100 psi without leakage or failure. The test pressure must be held for a period of 2 hours without a drop in pressure. All testing must be witnessed and certified by Owner.

A Work included: Provide a complete electrical system as indicated on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:

1. Branch circuit wiring in conduit to sump pump controls and sump pumps
2. Installing sump pump controls and service poles
3. Other items and services required to complete the systems whether particularly mentioned or not.

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

A. The entire installation shall be in accordance with the latest edition of the National Electrical Code, Occupational Safety and Health Act, and all local codes.

B. Apply and pay for all permits and inspections required by local or state laws

A The drawings show the general location of outlets, conduits and circuit arrangement. Because of the small scale of drawing, it is not possible to indicate all of the details involved. The Contractor shall carefully investigate the structural and finish conditions affecting all his work and shall arrange such work accordingly, furnishing such fittings, junction boxes and accessories as may be required to meet such conditions.

A Provide only materials that are new, of the type and quality specified. Where Underwriter's Laboratories, Inc. have established standards for such materials, provide only materials bearing the UL label.

A All raceways shall be:

- 1 PVC Schedule 40 Underground
- 2 Full weight hot dipped galvanized above ground

A Conductors shall be 600 volt, 75 degrees C, Type RHH-RHW-USE Sizes #14, #12, and #10 shall be solid except that stranded shall be used where installed in flexible conduit and for control. Sizes #8 and larger shall be stranded. Equipment grounding conductors shall be same type as specified above for circuit conductors.

A Bushings for conduits 1" or larger shall be grounding type. Bond to ground bar or lug of enclosure.

A Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

- 1 Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section

A. Install no conductor smaller than #12 AWG, unless otherwise indicated. All conductors shall be copper. Conductors shall be as shown on the plans or as specified therein. All wiring shall be continuous from outlet to outlet, and by color and together with size, grade and manufacturer. Pull boxes, etc. shall not be considered outlets, and the wiring shall be continuous, without joints, through the pull boxes.

A. All No. 12 and No. 10 conductors in the 120/240 volt, 3 wire, 60 hertz system shall have Phase "A" - black; Phase "B" - red, and the neutral wire white. All equipment grounding conductors shall be green. All conductors No. 8 and larger and all feeders shall be marked with plastic tape to match the above color coding.

A. Conductors shall be joined securely both mechanically and electrically. Wire No. 8 and smaller shall be soldered and insulated with heat shrink and plastic electrical tape to provide insulation equal to the original conductor (approved pressure type mechanical connectors may be used). Wire No. 8 and larger shall be connected with compression type solderless connectors and insulated with heat shrink and plastic electrical tape to provide insulation equal to the original conductor.

A. All wiring shall be in raceways. Securely and rigidly support raceways at all boxes, outlets and turns, and not over 8 feet on centers.

- B. Exposed raceways shall be installed either parallel or perpendicular.
- C. Run raceways, butt ends into couplings; 3 quarter bends per run maximum; install to pull box in an inaccessible location; fasten raceway to boxes with locknuts and bushing.
- D. Tables 3A and 3B of the National Electrical Code shall apply unless larger raceways are specified.

A. The electrical system and motors shall be grounded and bonded in accordance with Article No. 250 of the National Electric Code.

A. Provide personnel and equipment, make required tests, and secure required approvals from the Engineer and governmental agencies having jurisdiction.

A On completion of the electrical work, all debris, scraps, and other waste material left by this Contractor shall be collected and removed from the premises. All electrical equipment, conduit, enclosures and boxes shall be thoroughly cleaned of all foreign materials.

A. All motors and controls for equipment shall be furnished by the equipment manufacturer. The electrical contractor shall verify voltage, dimensions, extent, type, etc. of the and all other such electrical equipment, and furnish and install all electrical supply and control equipment and material required to put all the items in proper operating condition.

A Test all service entrance and feeder wiring using an instrument which applies a voltage of approximately 500 volts DC to provide a direct reading of resistance.

B Meg grounding systems to measure ground resistance, and provide not more than 25 ohms resistance, adding ground rods as necessary to achieve that level.

- C. All tests shall be conducted in presence of Owner or his representative. All resulting readings shall be recorded, properly identified and submitted to Engineer for acceptance.
- D. Entire system shall be free from all shorts and grounds; equipment bonded and grounded in full compliance with local and national codes.
- E. Provide a qualified foreman and crew to perform such electrical work as may be required by the Engineer.
- F. Turn over to Owner 100% spare fuses for all sizes and types installed on the project.

SWY assumes responsibility for the design concept and installation of the process or installation shown in these drawings. B. P. Barber is responsible for the engineering design which converts the design concept into these drawings.

## **Appendix C**

### **Determination of Ground-Water Protection Standards**

**APPENDIX C**

**DETERMINATION OF GROUND-WATER  
PROTECTION STANDARDS**

**SOUTHERN WOOD PIEDMONT COMPANY  
CHATTANOOGA, TENNESSEE**

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## **APPENDIX C**

### **DETERMINATION OF GROUND-WATER PROTECTION STANDARDS**

#### **1.0 INTRODUCTION**

This appendix to the Part B permit renewal application for the Southern Wood Piedmont (SWP) Chattanooga, Tennessee site includes an alternate concentration limit (ACL) demonstration in accordance with TN Rule 1200-1-11.06(e) 2. The purpose of this ACL demonstration is to justify ground-water protection standards (GWPS) to be used in compliance monitoring at the point-of-compliance (POC) which are higher than default maximum allowable concentration limits established for drinking water. The demonstration is consistent with United States Environmental Protection Agency (USEPA) guidance (USEPA, 1987a). The following summarizes the ACL development process.

An ACL is the concentration at the POC below which the Maximum Allowable Concentration Limit (MACL) will not be exceeded at the point-of-exposure (POE). The development of constituent-specific ACLs includes the quantification of subsurface transport of constituents from the POC to the POE. This quantification allows for the back-calculation of the ACL.

At the SWP Chattanooga Creek site, the POE is the surface waters of Chattanooga Creek. Transport of constituents from the POC to the POE occurs via subsurface transport to the creek bank and subsequent dilution of ground water with surface water in the creek after discharge of ground water into the creek. For the purposes of this ACL demonstration, it was conservatively assumed that the constituent concentration in the ground water at the POC (point of application of ACL) was the same as the constituent concentration in the ground water at the creek bank (i.e. subsurface attenuation was assumed to be zero).

The ACL was calculated on calculated dilution factors for ground water discharging into Chattanooga Creek at 3 day, 20-year low creek flow. When calculating the ACL, the constituent concentrations in Chattanooga Creek were assumed to be equal to the governing MACL. The allowable constituent concentrations in the ground water at the point of discharge to the creek, and thus that at the POC, were back-calculated by dividing the MACL by the appropriate dilution factors.

## 2.0 SELECTION OF SITE-SPECIFIC CONSTITUENTS

Site-specific hazardous constituents were selected from the constituents detected in the ground water in site monitoring wells. Ground-water samples collected prior to January 1988 were analyzed using gas chromatography (GC). After January 1988, ground-water samples were analyzed using gas chromatography/mass spectroscopy (GC/MS). Previous analytical results using GC indicated the possible presence of some constituents (e.g. pentachlorophenol) which could not be fully resolved using GC. Thus to get a better indication of the constituents in groundwater, the analytical results using GC/MS (1988-2000) were used in the selection of site-specific constituents.

The selection of site-specific constituents from the constituents detected in ground water at the site was based upon the following procedure:

- Contained in Appendix IX of TN Rule 1200-1-11-.06
- Associated with wood preserving operations
- Mean concentration in downgradient monitoring wells greater than mean concentration of background monitoring well

A flow chart detailing the selection process for site-specific constituents has been included as Figure C-1.

Fifty-six listed Appendix IX constituents were detected in monitoring since January 1988: 12 inorganic and 44 organic constituents. Carbazole, which is not on Appendix IX, was also detected. Since this constituent is known to be present in creosote, it was included as a site-specific constituent. Table C-1 provides a summary of the positive detections from the Appendix IX sampling from 1988 to 1996. The mean concentrations of seven of the 12 inorganic constituents (barium, cobalt, chromium, copper, nickel, lead and vanadium) were below the mean concentration of the background sample. These metals were not included in the site-specific list. Cadmium and tin were only detected once, so they were not included as site-specific constituents.

The three inorganic constituents (arsenic, chromium, and sulfide) may be associated with creosote wood preserving operations and thus were included on the site-specific constituent list.

Detections from the 1988 to 1996 Appendix IX analyses have been provided and show the following constituents not on the site-specific list:

1,1,2-Trichloroethane  
Trichloroethylene  
Fluoride  
2,4,5-T  
2,4-D  
Lindane  
Methoxychlor  
Methyl Parathion  
Sulfotepp  
Acrolein  
2-Butanone  
Benzyl Alcohol  
Bis(2-ethylhexyl)phthalate  
Methylene Chloride

1,1,2-Trichloroethane, trichloroethylene, and fluoride were not included on the site-specific constituent list because these constituents are not associated with creosote wood treating operations. Additionally, the 1,1,2-trichloroethane was detected in the upgradient monitoring well only, and the trichloroethylene was detected once in well C-07A located adjacent to the creek where other sources exist. Six pesticides (2,4,5-T; 2,4-D; Lindane; methoxychlor; methyl parathion; and sulfotepp) were not included as site-specific constituents because these pesticides are not associated with wood treating operations. Acrolein, 2-butanone, benzyl alcohol, bis(2-ethylhexyl)phthalate, and methylene chloride are possible sampling and laboratory artifacts which are not associated with wood treating operations; therefore, these constituents were not included as site-specific constituents. The 33 site-specific constituents selected with this process are listed in Table C-2.

### **3.0 PHYSICAL AND CHEMICAL PROPERTIES OF SITE-SPECIFIC CONSTITUENTS**

Physical and chemical properties were obtained from available literature for the site-specific constituents. The physical and chemical properties evaluated include: formula weight, melting point, boiling point, vapor density, specific gravity, vapor pressure, diffusion coefficients, Henry's Law constant, aqueous solubility, octanol-water partition coefficient, and organic carbon partition coefficient. These physical and chemical properties and their references are provided in Table C-3.

## 4.0 EXPOSURE PATHWAYS AND RECEPTORS

### 4.1 Ground-Water Pathway

Ground-water elevations have been routinely measured in the site monitoring wells since 1981. Elevations of the surface water in Chattanooga Creek have also been measured and correlated to the site ground-water flow regime, indicating the discharge of ground water from beneath the site into Chattanooga Creek. In 1990, a ground-water intercept trench was installed adjacent to Chattanooga Creek. The purpose of this trench is to facilitate the interception and collection of contaminated ground water between the POC and the point of exposure by pumping and discharging to the local POTW in the event GWPS are exceeded at the POC.

Potentiometric surface data were reviewed for both the residual soil and fractured rock ground-water bearing zones. Ground-water flow directions in both the residual soil and the fractured rock water bearing zones are in an easterly direction from a potentiometric high near the northwest property corner. Figure C-2 shows the general direction of ground-water flow without operation of the ground-water intercept trench adjacent to Chattanooga Creek.

For this submittal two ground-water flow segments have been defined, based on hydrogeologic characteristics (zone thickness and permeability) and ground-water quality. These segments, which extend along Chattanooga Creek are indicated in Figure C-2. Conservative values of flow zone thickness, hydraulic conductivity, and gradient were assigned to each segment. Utilizing a one-dimensional numerical solution (Darcy's Law) the ground-water discharges to the Chattanooga Creek were computed for each discharge segment. Flows from the individual segments are  $1.5 \times 10^{-3}$  and  $3.8 \times 10^{-3}$  cubic feet per second (cfs), respectively.

Receptors working or residing at or near the SWP facility are not expected to be exposed to potentially contaminated ground water associated with the site as potable water, because potable water in the area is provided by the Tennessee-American Water Company. Known water supply wells in the site area are used for industrial purposes and most are completed in a separate geologic formation than screened by the site monitoring and recovery wells. SWP will maintain restrictions against installation of drinking water wells on the site or in the area along Chattanooga Creek to prevent future exposures. Therefore, exposure to the constituents detected in the ground water may occur only after discharge to Chattanooga Creek.

## 4.2 Surface Water Pathway

Chattanooga Creek may potentially be impacted by the discharge of ground water flowing beneath the site. Surface water run-off from the site has been documented to be clean (SWP, 1999a and 2000a) and is managed under a National Pollution Discharge Elimination System stormwater permit.

During the period of July 12-20, 1982, biological, bacteriological, and chemical water samples were collected from Chattanooga Creek and in two of its tributaries to Dobbs Branch (Figure C-3) (Tennessee Department of Health and Environment [TDHE], 1983). Site-specific organic constituents were not detected above the method detection limits at any sampling station along the creek. Various metals were detected at concentrations just above or at the method detection limits. The majority of the other constituents and parameters detected during the survey are not related to the wood preserving operations performed by SWP.

Surface water samples were collected from flowing drainage features on-site within the low swampy area downgradient from the plant operations and from Chattanooga Creek by Southern Wood Piedmont Company in 1985 (when the treating plant was in operation). No evidence of wood preserving constituents in the surface water samples was indicated as a result of these analyses.

Surface water samples were also collected in 1996 at three locations in Chattanooga Creek in the vicinity of SWP. Surface water samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides/polychlorinated biphenyls, cyanide, and cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc. These analytes, including potential wood preserving related constituents, were not detected in the 1996 surface water samples.

A posted ban on fishing is currently imposed on the creek by TDHE. No agricultural use is made of the water in Chattanooga Creek downstream of the facility (United States Department of Agriculture, 1980). The creek is not classified for drinking water or recreation (Water Quality Rules, Tennessee 1200-4-3.03, et seq.). However, for the ACL demonstration, an extremely conservative approach was assumed; Drinking Water Standards and Ambient Water Quality

Criteria were used. These criteria assume humans may be exposed to site-specific constituents via ingestion of the surface water and contaminated fish.

#### **4.3 Receptors**

As discussed above, exposure to site-specific constituents transported by ground water could only occur at Chattanooga Creek.

There are no known drinking water intakes along the creek. Furthermore, the Tennessee American Water Company's withdrawal point on the Tennessee River is located approximately 3.5 miles upstream from the confluence of Chattanooga Creek and the Tennessee River. Therefore human exposure to contaminated ground water is most likely to occur via dermal contact with and incidental ingestion of water in the creek while walking or wading in the Creek or by consuming contaminated fish. A posted ban on swimming and fishing is imposed on the creek. However, fishing and swimming was reported during the study conducted by TDHE in 1983. It is possible that humans are using the creek for recreational purposes other than swimming.

Chattanooga Creek flows through the Chattanooga Valley between Lookout Mountain and Missionary Ridge and empties into the Tennessee River at an elevation of 634 feet National Geotechnic Vertical Data (TDHE, 1983). In the area of the SWP facility, the stream flows through an extensive and well-developed floodplain which serves as a buffer from industrial and municipal influences. The floodplain hardwood community is composed of silver maple, hackberry, black willow, box elder and sycamore trees. Canopy coverage ranges from 50-90% in the vicinity of the SWP facility. Bushes, such as buttonwood, are prominent along the shallow areas. Herbaceous plants, such as smartweed and white heath aster, are abundant in certain areas of the understory where full sunlight occurs.

The TDHE undertook a study of Chattanooga Creek in 1982. Four locations (Figure C-3) were chosen for the collection of aquatic flesh samples. Fish, frogs, and turtles were collected at these locations. These locations were chosen according to the following criteria: (1) to represent areas of different contaminant types; (2) to study areas where a significant amount of fishing occurs; and (3) to sample representative locations of all reaches of the creek.

The streamside community was visually surveyed during site visits by Law Environmental personnel in October 1, 1986 and 1996. Bullfrogs were found to be very abundant at streamside. Mammals sighted along the creekside consisted of gray squirrels and muskrats. Based upon the presence of burrows, groundhogs are also present at the site (Table C-4).

LAW conducted an ecological evaluation of Chattanooga Creek in 1996. Ecological evaluation activities included a visual survey of wildlife (Table C-4). In addition, assessments were performed for fish and macroinvertebrate communities and aquatic habitats (Tables C-5 and C-6). Figure C-3 presents the placement of sampling locations evaluated during LAW's ecological evaluation.

Information on the aquatic community was derived from studies conducted by the TDHE (1983), USEPA (1992), and LAW (1997). These studies examined both benthic macroinvertebrates and fish within Chattanooga Creek. However, specific locations varied among the studies precluding direct comparisons.

The TDHE conducted a qualitative study of benthic macroinvertebrates in the Creek using dip nets, sieves, and selective hand sorting of vegetation and detritus (TDHE, 1983). Results of the TDHE study indicated that the reach downstream of the confluence of the Creek and Dobb's Branch (TDHE Locations 1 and 2) was moderately to severely degraded. Samples from TDHE Locations 5 and 6 were reported to have exhibited improved conditions over the downstream locations, but had fewer individuals and taxa when compared to the upstream reference locations. TDHE Location 7 and other upstream locations had moderate to healthy aquatic macroinvertebrate populations, including pollution intolerant taxa. Overall, the results of LAW's investigation (LAW, 1997) were similar to those reported in the TDHE investigation.

The USEPA conducted a study of benthic macroinvertebrates in the Creek (USEPA, 1992). Results from samples collected at the USEPA locations upstream of the SWP property indicated moderately adequate macroinvertebrate populations. The USEPA did not have sample locations adjacent to the SWP property; therefore, direct comparisons of sample results generated from the TDHE and LAW investigations from that reach of the Creek were not possible.

LAW conducted a fish survey of the Creek which yielded data indicative of a moderate fish community in terms of number of species and total catch (LAW, 1997). A total of 313 fish were

collected representing 17 fish species from three sampling reaches. Bluegill accounted for nearly 37 percent of the total catch, followed by green sunfish (21.1 percent), central stoneroller (8.9 percent), and redbreast sunfish (8.6 percent).

The TDHE (1983) indicated that they were successful in obtaining a moderate variety and number of aquatic organisms from Chattanooga Creek. The TDHE analyzed seven fish species for chemical constituents, but did not report the total number or identity of the other fish species collected. The USEPA (1992) reported a sparse fish community in their study of Chattanooga Creek. The USEPA analyzed tissue samples from nine species of fish, but did not identify or enumerate fish that were caught and not used for chemical analysis. The lack of species specific information from the TDHE and USEPA studies precluded direct comparisons among the three studies.

#### **4.4 Conclusions**

Based on the findings of the pathways analysis and the receptor evaluation, the primary route of exposure to site-specific constituents transported by ground water from the site to humans is through incidental ingestion of surface water and consumption of fish. Though the frequency of exposure is most likely not daily, Drinking Water Standards and Ambient Water Quality Criteria were used in the development of ACLs. These criteria conservatively assumed that a 70 kg adult ingests 2 liters of water and 6.5 grams of fish per day for 70 years.

As the aquatic community may be impacted by site-specific constituents discharged into Chattanooga Creek, exposure to the aquatic community was considered. Two modes of exposure were assumed for the ACL demonstration: 1) the aquatic population remained in the mixing zone where the concentration of site-specific constituents were highest (acute exposure) or 2) the aquatic population would swim through Chattanooga Creek only occasionally being exposed to the higher concentrations present in the mixing zone (chronic exposure).

## **5.0 DETERMINATION OF GOVERNING MAXIMUM ALLOWABLE CONCENTRATION LIMITS**

### **5.1 Overview**

Maximum allowable concentration limits (MACLs) are dependent upon the type of exposed receptor and the route of exposure. Routes of exposure and receptors are discussed in Section 4.0 of this appendix. The potential receptors of concern at the SWP Chattanooga Creek site are human and aquatic receptors. Humans may be exposed to wood preservative constituents transported via ground water from the SWP site through incidental ingestion of surface water and consumption of fish in Chattanooga Creek. The MACLs cited in this application conservatively protect humans from both carcinogenic and non-carcinogenic effects associated with consumption of surface water (more than just incidental ingestion) and potentially contaminated fish. MACLs for environmental receptors were evaluated for both chronic and acute exposure.

The MACLs presented in Table C-7 have been based on current USEPA guidance (USEPA, 1987a). The ACL guidance states that:

"allowable exposure concentration [MACLs] can be derived by using MCLs or applying appropriate exposure assumptions to established RfDs [reference doses] or PFs [carcinogen slope factors (CSFs)] or alternate dose levels derived from the literature if established dose levels are not available."

SWP established a hierarchy for determining the MACL based upon available drinking water standards and health-based concentrations. The hierarchical order for establishing an MACL is as follows:

- 1) Available Maximum Concentration Limits (MCLs) and secondary MCLs (sMCLs),
- 2) Ambient Water Quality protective of human health through the ingestion of water and organisms, and
- 3) USEPA reviewed toxicological data (e.g. RfDs and CSFs),

The rationale for determining the MACLs is described in the following sections. The process for determining an MACL is illustrated in Figure C-4.

## 5.2 MACLs - Human Receptors

MACLs were developed for human consumption of surface water (i.e., drinking the creek water) and consumption of potentially contaminated fish. As shown on Figure C-4, in cases where a MCL existed for a particular constituent, the MCL was used as the MACL. Where MCLs were not available, sMCLs were used (USEPA, 2000). An sMCL was available for sulfide (USEPA, 2000). Therefore, the surface water and ground water MACL for sulfide was defined as the sMCL (Table C-7).

In the absence of MCLs or sMCLs, the MACL was based on the ambient water quality criteria value for the ingestion of water and organisms by humans (USEPA, 1999).

As shown on Figure C-4, in the absence of MCLs, sMCLs, or ambient water quality criteria, the MACLs were calculated from toxicological data. This occurred for three constituents: 1,2-dimethylbenzene, 1,3-dimethylbenzene, and 1,4-dimethylbenzene. These MACLs were based upon human toxicity values (i.e. RfD) and bioconcentration factors (BCF). The calculation used standard factors of body weight and intake (USEPA 1987a, 1987b, 1989a, and 1989b). The formula used to calculate these MACLs for surface water was:

$$\text{MACL} = \frac{\text{RfD} \times \text{BW} \times \text{BCF}}{\text{I}} \quad (1)$$

Where MACLn = MACL for constituent

RfD = reference dose (mg/kg/day)

BW = assumed body weight = 70 kg

I = assumed intake rate = 2 L/day + 6.5 g/day x BCF

BCF = bioaccumulation factor (mL/mg)

The key inputs to the MACL are the RfD and the BCF. Most of the RfDs were obtained from the IRIS database. The RfDs for 1,2-dimethylbenzene, 1,3-dimethylbenzene, and 1,4-

dimethylbenzene were obtained from the TOXNET database. Where possible, the BCFs were obtained from the TOXNET database. BCFs not available from the USEPA Ambient Water Quality Criteria Documents were calculated with either equation (2) or (3) based upon either water solubility (S) in mg/L or the octanol/water partition coefficient (Kow):

$$\log \text{BCF} = 0.85 \log \text{Kow} - 0.70 \text{ (Veith, et al., 1979) (2)}$$

$$\log \text{BCF} = 3.04 - 0.568 \log S \text{ (Verschuere, 1983) (3)}$$

When both S and Kow were available, the greater BCF produced by either equation was used to calculate the MACLs for surface water. The MACLs for human consumption of surface water and fish are listed on Table C-7. The BCFs used to calculate the MACLs are listed on Table C-8. The RfD for naphthalene was used for 2-methylnaphthalene. RfDs for phenanthrene and acenaphthylene were based on pyrene. Current toxicological information is not available for dibenzofuran, so the RfD was based on withdrawn toxicological values.

### 5.3 MACLs - Environmental Receptors

The MACLs developed in this section provide for the protection of ecological receptors from the short term (acute) effects and the long term (chronic) effects due to exposure to site-specific constituents in Chattanooga Creek surface water.

Existing information was used to develop the environmental receptor MACLs for the site-specific constituents where possible. This information was derived from available sources such as National Recommended Water Quality Criteria (USEPA, 1999), National Oceanic and Atmospheric Administration Screening Quick Reference (SQuiRT) Tables (NOAA, 1999), Tennessee Water Quality Criteria 1200-4-3.03, published environmental goals (e.g. Kingsbury, et al., 1980), and reviews (e.g. Verschuere, 1983). The hierarchy used in the selection of the aquatic MACLs was:

1. The MACLs (acute and chronic) were taken from the National Recommended Water Quality Criteria, when acute and chronic values were presented as criteria (USEPA, 1999).

2. The MACLs (acute and chronic) were taken from the Tennessee Water Quality Criteria, when acute and chronic values were presented as criteria.
3. The MACL acute and the MACL chronic were taken from the NOAA SQuiRT Tables (NOAA, 1999), when acute and chronic values were presented as criteria. Criteria Maximum Concentration values were used for acute criteria and Chronic Continuous Criteria were used as chronic criteria.
4. The MACL-acute was calculated based upon the relationship between octanol-water partition coefficient ( $K_{ow}$ ) and acute toxicity. This relationship is defined as MACL-acute (mg/l =  $1.8831 + 0.0000259 (K_{ow})$ ). The MACL-chronic was developed as 1/10 the MACL-acute.
5. The MACL-acute was taken from reviews of studies using the constituent on freshwater fish (see references in Table 4-1).
6. When not otherwise available, the MACL-chronic was developed as 1/10 the MACL-acute.
7. When not otherwise available, the MACL-acute was developed as 10 times the MACL-chronic.

For a number of constituents this database provided enough information for the direct selection of both the MACL-acute and MACL-chronic. However, the MACL-acute was calculated from the  $K_{ow}$  for four constituents (anthracene, carbazole, dibenzofuran, and fluorene). The MACL-chronic was developed as 1/10 of the acute value (see Tennessee Water Quality Criteria 1200-4-3.03). The calculation was based upon the following regression equation:

$$\text{MACL-acute} = 1.8831 + 0.0000259 \times K_{ow} \quad (r^2 = 0.94)$$

This equation was derived by regressing the acute values on the corresponding octanol-water partition coefficients ( $K_{ow}$ ) for anthracene, carbazole, dibenzofuran, and fluorene. The MACLs for ecological receptors are listed in Table C-7.

#### **5.4 Selection of Governing MACLs**

MACLs were developed for site-specific constituents transported from the SWP site to the surface water in Chattanooga Creek for chronic human exposure and acute and chronic exposure of environmental receptors within the creek. For chronic exposure (human MACL and ecological MACL-chronic), the more conservative (i.e. lower) MACL for each constituent was selected to be the governing MACL for that constituent. The ecological MACL-acute was used as the MACL for acute exposure. This was done to comply with USEPA guidance (USEPA 1987a).

## 6.0 ALTERNATIVE CONCENTRATION LIMIT CALCULATION

### 6.1 Introduction

The ACL development included the quantification of the transport of ground water containing site-specific constituents from the POC to the POE and then the back-calculation of the ACL using dilution of the constituents in the ground water into the surface water of the creek. This is a conservative approach since the natural attenuation of constituents in the ground water as it flows from the POC to the POE is not taken into account.

### 6.2 Stream Dilution Calculations

The calculation of ACLs required an evaluation of the effects of stream dilution. A mathematical relationship between the potential loading of site-specific constituents into the creek and potential concentration in the creek was developed. This relationship then was used in the back-calculation of the ACL.

The concentration of a constituent in the creek will be dependent on the concentration of that constituent in the ground-water discharge and the relative volumes of ground-water discharging and volumetric surface water flow rate. The calculation of the constituent concentrations in the creek assumed that the constituents discharged with the ground water at a concentration equal to that at the creek bank and mixed with the volume of surface water into which the ground water was discharging. Mathematically,

$$C_{sw} = \frac{C_{gw} \times V_{gw}}{V_{sw}}$$

where,  $C_{sw}$  = calculated concentration in surface water (mg/L)

$C_{gw}$  = concentration in ground water at the creek bank (mg/L)

$V_{gw}$  = volume of ground-water discharge (cfs)

$V_{sw}$  = volume of surface water flow (cfs)

For the ACL calculation, the concentration in the surface water,  $C_{sw}$ , is conservatively set equal to the governing MACL and the concentration in the ground water at the creek bank,  $C_{gw}$ , is then conservatively equal to the ACL. A dilution factor,  $R$ , is defined as:

$$R = \frac{V_{gw}}{V_{sw}}$$

Therefore, division of the MACL by  $R$  will yield the ACL:

$$ACL = \frac{MACL}{R}$$

As described in Section 5.0, both acute and chronic exposure may occur in Chattanooga Creek. Acute exposure is associated with exposure to aquatic receptors in the mixing zone while chronic exposure is associated with exposure of humans or aquatic receptors throughout the creek. Thus, two dilution factors,  $R_a$  and  $R_c$  for acute and chronic exposure, respectively, need to be defined.

The volume of ground water discharging to the creek,  $V_{gw}$ , was estimated for Segment One and Segment Two (Figure C-2) of the site based on hydraulic conductivity, flow gradient, and cross-sectional area of flow zone at the POC. The estimation of the volume discharging from Segment One was 0.0015 cfs and 0.0038 cfs for Segment Two. The total volume of water flowing in the creek was conservatively estimated as the 3-day, 20-year low flow, which was reported to be 3.2 cfs (Jerry Lower, Tennessee Valley Authority, personal communication, May 30, 1986). For acute exposure (i.e. in the mixing zone), it was assumed that the mixing zone would consist of one-half of the volume of the creek. Therefore,  $V_{sw}$  for acute exposure would be 1.6 cfs while for chronic exposure  $V_{sw}$  would be 3.2 cfs. Therefore, the reduction factors for Segment One and Segment Two, respectively, were calculated by:

$$R_{c1} = \frac{0.0015}{3.2} = 4.69E-04$$

$$R_{a1} = \frac{0.0015}{1.6} = 9.38E-04$$

$$R_{c2} = \frac{0.0038}{3.2} = 1.19E-03$$

$$R_{a2} = \frac{0.0038}{1.6} = 2.38E-03$$

The chronic ACLs for Segment One and Segment Two are:

$$ACL_{c1} = \frac{MACL}{4.69E-04}$$

$$ACL_{c2} = \frac{MACL}{1.19E-03}$$

The acute ACLs for Segment One and Segment Two are:

$$ACL_{a1} = \frac{MACL}{9.38E-04}$$

$$ACL_{a2} = \frac{MACL}{2.38E-03}$$

The calculations of ACLs for Segment One and Segment Two for the site-specific constituents are depicted in Table C-9. Governing ACLs were for Segment One and Segment Two were selected as the most conservative (i.e. lowest) of the acute or chronic ACL (Table C-9).

## **7.0 SELECTION OF GROUND-WATER PROTECTION STANDARDS**

The Governing ACL was selected based on the following criteria:

GWPS = ACL, if  $ACL < \text{solubility}$

GWPS = solubility, if  $ACL > \text{solubility}$

GWPS = detection limit, if  $ACL < \text{detection limit}$

These criteria provided that the GWPS would be reasonable, achievable, and protective of human health and the environment. The selection of the GWPSs for the site-specific constituents is depicted in Table C-10.

## 8.0 REFERENCES

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## TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996**  
**Southern Wood Piedmont**  
**Chattanooga, Tn**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Detection Limit
1,1,2-Trichloroethane, ppm 11/4/1993	--	--	--	0.009	0.005
1,2-Dimethylbenzene, ppm 2/4/1988	0.1	0.04	0.01	--	0.001
6/29/1988	0.22	0.13	0.041	--	0.001
9/13/1988	0.1	79	0.01	--	0.001
10/12/1988	0.13	0.053	0.023	--	0.001
3/20/1989	0.11	0.041	0.011	--	0.001
5/4/1989	0.24	0.12	0.011	--	0.001
7/19/1989	0.141	0.071	0.007	--	0.001
12/21/1989	0.11	0.13	0.0091	--	0.001
5/8/1990	0.18	0.025	0.0077	--	0.001
7/11/1990	0.17	0.021	0.056	--	0.001
10/17/1990	0.13	0.072	0.004	--	0.001
1/16/1991	0.23	0.034	--	--	0.001
5/28/1991	0.15	0.21	--	--	0.01
5/28/1991	--	--	0.006	--	0.001
8/14/1991	0.15	0.12	0.0015	--	0.001
10/9/1991	0.077	0.069	--	--	0.001
6/3/1992	0.21	0.13	0.015	--	0.001
8/26/1992	0.12	0.1	0.0016	--	0.001
11/19/1992	--	0.066	0.0026	--	0.001
2/24/1993	0.13	0.065	--	--	0.001
5/27/1993	0.15	0.083	0.0014	--	0.001
8/12/1993	0.190	0.18	--	--	0.001
6/15/1994	0.45	0.17	0.0072	--	0.001
9/13/1994	0.15	0.11	0.0027	--	0.001
12/13/1994	0.22	0.025	--	--	0.005
3/16/1995	0.45	0.34	0.0012	--	0.001
5/16/1995	0.22	0.23	--	--	0.001
7/26/1995	0.3	0.29	0.0013	--	0.001
10/19/1995	0.14	0.0051	0.19	--	0.005
3/5/1996	0.2	0.14	0.0037	--	0.001
6/19/1996	0.16	0.12	0.0027	--	0.001
1,3-Dimethylbenzene, ppm 2/4/1988	0.19	0.06	0.02	--	0.001
6/29/1988	--	0.2	0.07	--	0.001

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Detection Limit
1,3-Dimethylbenzene, ppm					
9/13/1988	0.093	45	0.004	--	0.001
3/20/1989	0.18	0.055	0.017	--	0.001
5/4/1989	0.22	0.065	0.007	--	0.001
7/19/1989	0.248	0.101	0.016	--	0.001
12/21/1989	0.1	0.76	0.0045	--	0.001
5/8/1990	0.18	0.017	0.0039	--	0.001
7/11/1990	0.18	0.015	0.037	--	0.001
10/17/1990	0.14	0.049	0.002	--	0.001
1/16/1991	0.23	0.027	0.0013	--	0.001
5/28/1991	--	--	0.002	--	0.001
5/28/1991	0.095	0.093	--	--	0.01
8/14/1991	0.34	0.22	0.0062	--	0.001
10/9/1991	0.26	0.2	--	--	0.001
2/19/1992	0.15	0.052	0.0021	--	0.001
6/3/1992	0.21	0.14	0.018	--	0.001
8/26/1992	0.12	0.099	0.0025	--	0.001
11/19/1992	0.072	0.056	--	--	0.001
2/24/1993	0.49	0.042	0.0057	--	0.001
5/27/1993	0.31	0.16	0.004	--	0.001
8/12/1993	0.17	0.18	0.0031	--	0.001
6/15/1994	0.25	0.25	--	--	0.001
9/13/1994	0.34	0.23	0.0057	--	0.001
12/13/1994	0.48	0.052	0.066	--	0.005
3/16/1995	0.22	0.12	0.0037	--	0.001
5/16/1995	0.18	0.13	--	--	0.001
7/26/1995	0.16	--	0.0029	--	0.001
10/19/1995	0.29	--	0.10	--	0.005
3/5/1996	0.11	0.076	0.0022	--	0.001
6/19/1996	0.14	0.12	0.0027	--	0.001
1,4-Dimethylbenzene, ppm					
10/12/1988	12	3.2	7.7	--	0.001
3/20/1989	0.1	0.041	0.01	--	0.001
3/16/1995	0.04	0.19	0.0013	--	0.001
5/16/1995	0.092	--	0.0031	--	0.001
7/26/1995	--	0.13	--	--	0.001

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Detection Limit
2,4,5-T, ppm					
11/4/1993	0.0017	--	--	--	0.0005
2,4-Dichlorophenoxyacetic acid,					
11/19/1992	0.0016	--	--	--	0.0005
11/4/1993	0.011	0.0018	--	--	0.0005
12/13/1994	--	0.0014	--	--	0.0005
2,4-Dimethylphenol, ppm					
2/4/1988	2.4	0.14	--	--	0.01
10/12/1988	2.5	--	--	--	0.2
3/20/1989	2.8	--	--	--	0.2
7/19/1989	2.4	--	--	--	0.2
12/21/1989	1.5	--	--	--	0.2
5/8/1990	1.7	--	--	--	0.2
7/11/1990	1.3	--	--	--	0.2
10/17/1990	1.8	1.8	--	--	0.01
1/16/1991	2	0.25	--	--	0.01
5/28/1991	1.3	0.79	--	--	0.1
8/14/1991	1.2	0.31	--	--	0.01
10/9/1991	1.9	1.4	--	--	0.1
2/19/1992	2.5	--	--	--	1
11/19/1992	0.47	--	--	--	0.01
11/19/1992	--	0.38	--	--	0.1
2/24/1993	0.6	--	--	--	0.5
2-Butanone, ppm					
10/12/1988	6	1.7	4.9	--	0.01
2-Methylnaphthalene, ppm					
2/4/1988	48	3.1	1.4	--	0.01
6/29/1988	2.4	1.2	--	--	0.01
9/13/1988	3.7	1.6	0.75	--	0.01
10/12/1988	6.1	1.5	4.9	--	0.2
3/20/1989	7.8	32	11	--	0.2
5/4/1989	--	--	1.1	--	0.01
5/4/1989	27	3.9	--	--	0.2
7/19/1989	--	1	0.61	--	0.01
7/19/1989	2.2	--	--	--	0.2
12/21/1989	--	1.2	0.47	--	0.01

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Detection Limit
2-Methylnaphthalene, ppm					
12/21/1989	1.4	--	--	--	0.2
5/8/1990	--	1.1	0.31	--	0.01
7/11/1990	--	--	0.88	--	0.01
7/11/1990	2.4	2.3	--	--	0.2
10/17/1990	3.3	3	0.34	--	0.01
1/16/1991	1.7	8.2	0.5	--	0.01
5/28/1991	1.7	1.3	--	--	0.1
8/14/1991	1.4	2.1	0.46	--	0.01
10/9/1991	2	2.9	--	--	0.01
2/19/1992	3.1	17	2.1	--	0.01
6/3/1992	1.3	1.5	16	--	0.01
8/26/1992	--	--	0.16	--	0.01
8/26/1992	1.2	2.9	--	--	1
11/19/1992	0.57	--	--	--	0.01
11/19/1992	--	1.5	--	--	0.1
2/24/1993	--	--	0.26	--	0.05
2/24/1993	1.5	1.5	--	--	0.5
5/27/1993	--	--	0.26	--	0.05
5/27/1993	1.2	--	--	--	0.5
5/27/1993	--	3.4	--	--	1
8/12/1993	--	--	0.18	--	0.04
8/12/1993	1.3	1.5	--	--	1
11/4/1993	1.5	2.3	0.22	--	0.01
6/15/1994	--	--	0.23	--	0.05
6/15/1994	1.6	1.7	--	--	1
9/13/1994	--	--	0.29	--	0.04
9/13/1994	--	2	--	--	1
9/13/1994	0.76	--	--	--	0.5
12/13/1994	1.8	2	0.4	--	0.01
3/16/1995	--	--	0.24	--	0.04
3/16/1995	1.8	2.5	--	--	1
5/16/1995	--	--	0.18	--	0.02
5/16/1995	1.1	2.4	--	--	1
7/26/1995	--	--	0.19	--	0.02
7/26/1995	1	2.4	--	--	1
10/19/1995	1.8	3.7	0.27	--	0.01
3/5/1996	--	--	0.13	--	0.02
3/5/1996	1.5	4.1	--	--	1

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Detection Limit
<b>2-Methylnaphthalene, ppm</b>					
6/19/1996	--	--	0.16	--	0.02
6/19/1996	1.2	2.4	--	--	1
11/14/1996	--	--	0.21	--	0.04
11/14/1996	2	1.8	--	--	1
<b>Acenaphthene, ppm</b>					
2/4/1988	30	1.5	0.94	--	0.01
6/29/1988	1.6	1.2	1.2	--	0.01
9/13/1988	1.9	3.5	1	--	0.01
10/12/1988	8.2	2.2	6.6	--	0.2
3/20/1989	5.3	25	10	--	0.2
5/4/1989	27	3.8	--	--	0.2
5/4/1989	--	--	0.92	--	0.01
7/19/1989	--	0.64	0.51	--	0.01
7/19/1989	1.8	--	--	--	0.2
12/21/1989	--	0.54	0.51	--	0.01
12/21/1989	0.61	--	--	--	0.2
5/8/1990	--	0.8	0.42	--	0.01
5/8/1990	0.78	--	--	--	0.2
7/11/1990	0.91	1	--	--	0.2
7/11/1990	--	--	0.7	--	0.01
10/17/1990	2	1.7	0.35	--	0.01
1/16/1991	0.82	7.5	0.55	--	0.01
5/28/1991	--	--	0.36	--	0.01
5/28/1991	0.6	1.2	--	--	0.1
8/14/1991	0.65	1.3	0.49	--	0.01
10/9/1991	0.94	2	--	--	0.1
2/19/1992	--	13	--	--	10
2/19/1992	1.6	--	1.9	--	1
6/3/1992	0.72	1.1	--	--	0.5
6/3/1992	--	--	18	--	5
8/26/1992	--	--	0.15	--	0.01
8/26/1992	--	2.4	--	--	1
11/19/1992	0.016	--	0.27	--	0.01
11/19/1992	--	2	--	--	0.1
2/24/1993	1	1.2	--	--	0.5
2/24/1993	--	--	0.32	--	0.05
5/27/1993	--	3.2	--	--	1

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Detection Limit
<b>Acenaphthene, ppm</b>					
5/27/1993	--	--	0.29	--	0.05
5/27/1993	0.58	--	--	--	0.5
8/12/1993	--	--	0.22	--	0.04
8/12/1993	--	1.1	--	--	1
11/4/1993	--	1.5	0.27	--	0.01
6/15/1994	--	--	0.3	--	0.05
6/15/1994	--	1.3	--	--	1
9/13/1994	--	--	0.27	--	0.04
9/13/1994	--	1.3	--	--	1
12/13/1994	1.1	1.4	0.46	--	0.01
3/16/1995	--	--	0.29	--	0.04
3/16/1995	--	1.9	--	--	1
5/16/1995	--	--	0.22	--	0.02
5/16/1995	--	2.2	--	--	1
7/26/1995	--	--	0.26	--	0.02
7/26/1995	--	2.2	--	--	1
10/19/1995	--	2.8	0.31	--	0.01
3/5/1996	--	--	0.19	--	0.02
3/5/1996	--	3.7	--	--	1
6/19/1996	--	--	0.2	--	0.02
6/19/1996	--	1.8	--	--	1
11/14/1996	--	--	0.29	--	0.04
11/14/1996	1	1.2	--	--	1
<b>Acenaphthylene, ppm</b>					
2/4/1988	--	0.02	0.01	--	0.01
9/13/1988	0.08	0.02	0.01	--	0.01
10/12/1988	0.28	--	--	--	0.2
3/20/1989	--	0.32	--	--	0.2
1/16/1991	0.039	--	--	--	0.01
8/14/1991	0.038	0.035	--	--	0.01
11/19/1992	0.027	--	--	--	0.01
<b>Acrolein, ppm</b>					
12/21/1989	0.13	--	--	--	0.05
<b>Anthracene, ppm</b>					
10/12/1988	2.7	0.6	1.9	--	0.2
3/20/1989	0.91	6.1	1.8	--	0.2

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Detection Limit
<b>Anthracene, ppm</b>					
5/4/1989	--	--	0.065	--	0.01
5/4/1989	5.7	--	--	--	0.2
7/19/1989	--	0.04	0.03	--	0.01
7/19/1989	0.44	--	--	--	0.2
12/21/1989	--	0.05	0.04	--	0.01
7/11/1990	--	--	0.06	--	0.01
7/11/1990	--	0.12	--	--	0.2
10/17/1990	1.4	--	--	--	0.01
1/16/1991	0.058	1.5	0.031	--	0.01
5/28/1991	--	--	0.012	--	0.01
5/28/1991	--	0.19	--	--	0.1
8/14/1991	0.048	0.2	0.04	--	0.01
10/9/1991	--	0.25	--	--	0.1
8/26/1992	--	--	0.024	--	0.01
11/19/1992	0.028	--	0.02	--	0.01
11/19/1992	--	0.39	--	--	0.1
11/4/1993	--	--	0.024	--	0.01
<b>Benzene, ppm</b>					
2/4/1988	0.2	--	0.006	--	0.001
6/29/1988	0.17	0.035	0.027	--	0.001
9/13/1988	0.08	0.02	0.008	--	0.001
3/20/1989	0.14	0.0066	0.0078	--	0.001
5/4/1989	0.19	0.019	0.0071	--	0.001
7/19/1989	0.2	0.015	0.014	--	0.001
12/21/1989	0.091	--	0.007	--	0.001
5/8/1990	0.18	0.027	0.0081	--	0.001
7/11/1990	0.16	0.0077	0.0061	--	0.001
10/17/1990	0.16	0.063	0.006	--	0.001
1/16/1991	0.28	0.015	0.0095	--	0.001
5/28/1991	--	--	0.014	--	0.001
5/28/1991	0.15	0.17	--	--	0.01
8/14/1991	0.25	0.13	0.012	--	0.001
10/9/1991	0.29	0.12	--	--	0.001
2/19/1992	0.13	0.038	0.011	--	0.001
6/3/1992	0.14	0.094	0.01	--	0.001
8/26/1992	0.14	0.1	0.017	--	0.001
11/19/1992	--	0.1	0.012	--	0.001
2/24/1993	0.085	0.051	0.0083	--	0.001
5/27/1993	0.12	0.072	0.014	--	0.001
8/12/1993	0.089	0.065	0.0087	--	0.001

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Limit
<b>Benzene, ppm</b>					
11/4/1993	0.13	0.044	0.012	--	0.005
6/15/1994	0.12	0.11	0.013	--	0.001
9/13/1994	0.13	0.095	0.012	--	0.001
12/13/1994	0.15	0.016	--	--	0.005
3/16/1995	0.09	0.05	0.009	--	0.001
5/16/1995	0.1	0.095	0.012	--	0.001
7/26/1995	0.073	0.058	0.0081	--	0.001
10/19/1995	0.084	0.015	0.073	--	0.005
3/5/1996	0.066	0.02	0.0099	--	0.001
6/19/1996	0.05	0.052	0.0077	--	0.001
11/14/1996	0.072	0.041	0.013	--	0.005
<b>Benzo(a)anthracene, ppm</b>					
2/4/1988	4.4	0.28	0.07	--	0.01
9/13/1988	0.41	0.58	0.17	--	0.01
10/12/1988	1.6	0.62	1.4	--	0.2
3/20/1989	0.49	6.6	1.6	--	0.2
5/4/1989	--	--	0.064	--	0.01
5/4/1989	4	1.3	--	--	0.2
7/19/1989	0.21	--	--	--	0.2
12/21/1989	--	--	0.04	--	0.01
7/11/1990	--	--	0.05	--	0.01
1/16/1991	0.021	1.6	0.014	--	0.01
5/28/1991	--	0.18	--	--	0.1
8/14/1991	0.013	0.15	0.022	--	0.01
10/9/1991	--	0.27	--	--	0.1
8/26/1992	--	--	0.013	--	0.01
11/19/1992	--	0.42	--	--	0.1
11/19/1992	0.010	--	--	--	0.01
<b>Benzo(a)pyrene, ppm</b>					
2/4/1988	1.5	0.13	0.03	--	0.01
9/13/1988	0.1	0.21	0.05	--	0.01
10/12/1988	0.54	0.28	0.52	--	0.2
3/20/1989	--	2.3	0.48	--	0.2
5/4/1989	2.2	0.74	0.032	--	0.01
7/11/1990	--	--	0.02	--	0.01
1/16/1991	--	0.77	--	--	0.01
8/14/1991	--	0.072	--	--	0.01
10/9/1991	--	0.12	--	--	0.1
<b>Benzo(b)fluoranthene, ppm</b>					
2/4/1988	2.1	0.13	0.03	--	0.01

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont  
Chattanooga, Tn**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Limit
<b>Benzo(b)fluoranthene, ppm</b>					
9/13/1988	0.64	0.56	0.45	--	0.01
10/12/1988	1.1	0.6	1.1	--	0.2
3/20/1989	0.39	4.7	1.3	--	0.2
5/4/1989	--	--	0.078	--	0.01
5/4/1989	4.5	1.6	--	--	0.2
12/21/1989	--	--	0.03	--	0.01
10/9/1991	--	0.12	--	--	0.01
3/20/1989	0.39	4.7	1.3	--	0.2
5/4/1989	--	--	0.078	--	0.01
5/4/1989	4.5	1.6	--	--	0.2
12/21/1989	--	--	0.03	--	0.01
7/11/1990	--	--	0.06	--	0.01
5/28/1991	--	0.11	--	--	0.1
8/14/1991	--	0.14	0.019	--	0.01
10/9/1991	--	0.24	--	--	0.1
<b>Benzo(k)fluoranthene, ppm</b>					
2/4/1988	2.2	0.13	0.02	--	0.01
9/13/1988	0.64	0.56	0.45	--	0.01
10/12/1988	1.1	0.6	1.1	--	0.2
Time:					17:03:24
	C-07	C-07A	C-07B	WQ-01	Detection Limit
<b>Benzo(k)fluoranthene, ppm</b>					
3/20/1989	0.39	4.7	1.3	--	0.2
5/4/1989	--	--	0.078	--	0.01
5/4/1989	4.5	1.6	--	--	0.2
12/21/1989	--	--	0.03	--	0.01
10/9/1991	--	0.12	--	--	0.01
<b>Benzyl alcohol, ppm</b>					
12/21/1989	--	--	0.26	--	0.02
<b>bis(2-Ethylhexyl) phthalate, ppm</b>					
12/21/1989	--	--	0.04	--	0.01
<b>Carbazole, ppm</b>					
6/29/1988	0.4	--	--	--	0.01
9/13/1988	0.5	0.53	0.09	--	0.01
10/12/1988	1.7	0.64	0.76	--	0.2
3/20/1989	0.79	3.3	0.54	--	0.2
5/4/1989	--	--	0.072	--	0.01
5/4/1989	11	0.79	--	--	0.2

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont**

	C-07	C-07A	C-07B	WQ-01	Limit
<b>Carbazole, ppm</b>					
7/19/1989	--	0.42	0.06	--	0.01
7/19/1989	0.39	--	--	--	0.2
12/21/1989	--	0.3	0.05	--	0.01
12/21/1989	0.36	--	--	--	0.2
5/8/1990	--	--	0.08	--	0.01
5/8/1990	0.4	--	--	--	0.2
7/11/1990	0.29	0.24	--	--	0.2
7/11/1990	--	--	0.07	--	0.01
10/17/1990	--	0.83	0.12	--	0.01
1/16/1991	0.79	1.7	0.11	--	0.01
5/28/1991	--	--	0.03	--	0.01
5/28/1991	0.33	1	--	--	0.1
8/14/1991	0.97	1.1	0.14	--	0.01
10/9/1991	0.68	0.67	--	--	0.1
8/26/1992	--	--	0.022	--	0.01
11/19/1992	--	--	0.026	--	0.01
11/19/1992	--	0.33	--	--	0.1
5/27/1993	--	--	0.051	--	0.05
5/27/1993	0.52	--	--	--	0.5
11/4/1993	--	--	0.039	--	0.01
12/13/1994	--	--	0.065	--	0.01
<b>Chrysene, ppm</b>					
2/4/1988	3.6	0.22	0.06	--	0.01
9/13/1988	0.18	0.46	0.14	--	0.01
10/12/1988	1.4	0.48	1.2	--	0.2
5/4/1989	4.2	1.1	--	--	0.2
5/4/1989	--	--	0.057	--	0.01
7/19/1989	0.23	--	--	--	0.2
12/21/1989	--	--	0.03	--	0.01
7/11/1990	--	--	0.04	--	0.01
1/16/1991	0.018	1.3	0.01	--	0.01
5/28/1991	--	0.24	--	--	0.1
8/14/1991	--	0.11	0.015	--	0.01
10/9/1991	--	0.19	--	--	0.1
11/19/1992	--	0.32	--	--	0.1
<b>Dibenzo(a,h) anthracene, ppm</b>					
2/4/1988	--	0.01	--	--	0.01
9/13/1988	0.02	0.04	0.02	--	0.01
<b>Dibenzofuran, ppm</b>					
2/4/1988	29	1.41	0.91	--	0.01
6/29/1988	--	0.84	--	--	0.01
9/13/1988	1.5	1.2	0.78	--	0.01

TABLE C-1

## Appendix .06/IX Constituent Concentrations From 1988 - 1996

## Southern Wood Piedmont

## Chattanooga, Tn

## ORGANICS

	C-07	C-07A	C-07B	WQ-01	Limit
Dibenzofuran, ppm					
10/12/1988	0.15	0.057	0.023	--	0.2
3/20/1989	3.9	20	8.4	--	0.2
5/4/1989	18	2.1	--	--	0.2
5/4/1989	--	--	0.58	--	0.01
7/19/1989	--	0.34	0.08	--	0.01
7/19/1989	0.86	--	--	--	0.2
12/21/1989	--	0.34	0.32	--	0.01
12/21/1989	0.42	--	--	--	0.2
5/8/1990	--	0.55	0.3	--	0.01
7/11/1990	0.87	0.96	--	--	0.2
7/11/1990	--	--	0.54	--	0.01
10/17/1990	1.5	1.4	0.28	--	0.01
1/16/1991	0.05	--	0.29	--	0.01
5/28/1991	--	--	0.11	--	0.01
5/28/1991	0.39	1.1	--	--	0.1
8/14/1991	0.44	0.85	0.3	--	0.01
10/9/1991	0.55	1.4	--	--	0.01
2/19/1992	1.2	10	1.4	--	0.01
6/3/1992	--	0.71	14	--	0.01
8/26/1992	--	--	0.094	--	0.01
8/26/1992	--	1.7	--	--	1
11/19/1992	0.21	--	0.15	--	0.01
11/19/1992	--	1.5	--	--	0.1
2/24/1993	0.63	0.75	--	--	0.5
2/24/1993	--	--	0.19	--	0.05
5/27/1993	--	2.2	--	--	1
5/27/1993	--	--	0.14	--	0.05
8/12/1993	--	--	0.13	--	0.04
11/4/1993	--	--	0.13	--	0.01
6/15/1994	--	--	0.15	--	0.05
9/13/1994	--	--	0.13	--	0.04
12/13/1994	--	--	0.22	--	0.01
3/16/1995	--	--	0.15	--	0.04
3/16/1995	--	1.4	--	--	1
5/16/1995	--	--	0.098	--	0.02
5/16/1995	--	1.5	--	--	1
7/26/1995	--	--	0.1	--	0.02
7/26/1995	--	1.3	--	--	1
10/19/1995	--	2.0	0.15	--	0.01
3/5/1996	--	--	0.11	--	0.02
3/5/1996	--	2.6	--	--	1
6/19/1996	--	--	0.095	--	0.02
6/19/1996	--	1.2	--	--	1
11/14/1996	--	--	0.13	--	0.04

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont**

	C-07	C-07A	C-07B	WQ-01	Limit
Dichloromethane, ppm					
11/14/1996	--	--	0.016	--	0.005
Ethylbenzene, ppm					
6/29/1988	0.2	0.069	0.022	--	0.001
9/13/1988	0.1	0.052	--	--	0.001
10/12/1988	7.8	2.2	6.3	--	0.001
3/20/1989	0.19	0.058	0.014	--	0.001
5/4/1989	0.21	0.07	0.0054	--	0.001
7/19/1989	0.201	0.069	0.009	--	0.001
12/21/1989	0.11	0.075	0.004	--	0.001
5/8/1990	0.25	0.019	0.0057	--	0.001
7/11/1990	0.19	0.0052	0.036	--	0.001
10/17/1990	0.15	0.052	0.002	--	0.001
1/16/1991	0.26	0.29	0.0023	--	0.001
5/28/1991	1.1	0.14	--	--	0.01
5/28/1991	--	--	0.002	--	0.001
8/14/1991	0.24	0.15	0.0017	--	0.001
10/9/1991	0.27	0.13	--	--	0.001
2/19/1992	0.15	0.052	0.0026	--	0.001
6/3/1992	0.22	0.13	0.012	--	0.001
8/26/1992	0.16	0.13	0.0013	--	0.001
11/19/1992	0.16	0.14	0.0012	--	0.001
2/24/1993	0.27	0.1	--	--	0.001
5/27/1993	0.21	0.1	--	--	0.001
8/12/1993	0.160	0.160	--	--	0.001
11/4/1993	0.17	0.12	--	0.0067	0.005
6/15/1994	0.23	0.16	--	--	0.001
9/13/1994	0.24	0.16	0.002	--	0.001
12/13/1994	--	0.034	--	--	0.005
3/16/1995	0.17	0.16	0.0012	--	0.001
5/16/1995	0.21	0.028	--	--	0.001
7/26/1995	0.15	0.11	--	--	0.001
10/19/1995	0.20	--	0.14	--	0.005
3/5/1996	0.16	0.12	0.0019	--	0.001
6/19/1996	0.098	0.082	--	--	0.001
11/14/1996	0.19	0.086	--	--	0.005
Fluoranthene, ppm					
2/4/1988	24	1.3	0.49	--	0.01
6/29/1988	0.98	1.1	1.1	--	0.01
9/13/1988	1.9	3.1	1.4	--	0.01
10/12/1988	11	2.9	9	--	0.2
3/20/1989	3.9	30	12	--	0.2
5/4/1989	--	--	0.61	--	0.01

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont**

	C-07	C-07A	C-07B	WQ-01	Limit
Fluoranthene, ppm					
5/4/1989	30	4.5	--	--	0.2
7/19/1989	--	0.06	0.05	--	0.01
7/19/1989	0.86	--	--	--	0.2
12/21/1989	--	0.15	0.18	--	0.01
5/8/1990	--	--	0.06	--	0.01
7/11/1990	--	--	0.23	--	0.01
7/11/1990	0.19	0.41	--	--	0.2
10/17/1990	--	1.2	0.11	--	0.01
1/16/1991	0.13	7.3	0.11	--	0.01
5/28/1991	--	--	0.048	--	0.01
5/28/1991	0.15	1	--	--	0.1
8/14/1991	0.1	0.85	0.21	--	0.01
10/9/1991	0.16	1.5	--	--	0.1
2/19/1992	--	--	1.5	--	1
2/19/1992	--	16	--	--	10
6/3/1992	--	0.54	--	--	0.5
6/3/1992	--	--	17	--	5
8/26/1992	--	2.7	--	--	1
8/26/1992	--	--	0.085	--	0.01
11/19/1992	--	2.7	--	--	0.1
11/19/1992	0.07	--	0.078	--	0.01
2/24/1993	--	--	0.08	--	0.05
5/27/1993	--	--	0.07	--	0.05
5/27/1993	--	3.4	--	--	1
8/12/1993	--	--	0.14	--	0.04
11/4/1993	--	--	0.089	--	0.01
6/15/1994	--	--	0.24	--	0.05
9/13/1994	--	--	0.07	--	0.04
12/13/1994	--	--	0.065	--	0.01
3/16/1995	--	--	0.2	--	0.04
3/16/1995	--	1.5	--	--	1
5/16/1995	--	--	0.068	--	0.02
5/16/1995	--	2.1	--	--	1
7/26/1995	--	2.3	--	--	1
7/26/1995	--	--	0.05	--	0.02
10/19/1995	--	2.4	0.092	--	0.01
3/5/1996	--	--	0.061	--	0.02
3/5/1996	--	3.5	--	--	1
6/19/1996	--	--	0.057	--	0.02
6/19/1996	--	1.5	--	--	1
11/14/1996	--	--	0.21	--	0.04
Fluorene, ppm					
2/4/1988	24	1.2	0.73	--	0.01
6/29/1988	--	1	--	--	0.01

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont  
Chattanooga, Tn**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Detection Limit
Fluorene, ppm					
9/13/1988	1.4	1.5	0.89	--	0.01
10/12/1988	0.14	0.098	0.047	--	0.2
3/20/1989	4	23	9.2	--	0.2
5/4/1989	--	--	0.66	--	0.01
5/4/1989	20	2.7	--	--	0.2
7/19/1989	--	0.3	0.08	--	0.01
7/19/1989	0.9	--	--	--	0.2
12/21/1989	--	0.36	0.35	--	0.01
12/21/1989	0.36	--	--	--	0.2
5/8/1990	--	0.5	0.3	--	0.01
7/11/1990	--	--	0.43	--	0.01
7/11/1990	0.5	0.74	--	--	0.2
10/17/1990	2.1	2	0.4	--	0.01
1/16/1991	0.41	5.9	0.31	--	0.01
5/28/1991	0.39	1.3	--	--	0.1
5/28/1991	--	--	0.16	--	0.01
8/14/1991	0.37	0.97	0.41	--	0.01
10/9/1991	0.43	1.6	--	--	0.01
2/19/1992	--	12	1.6	--	0.01
6/3/1992	--	0.71	15	--	0.01
8/26/1992	--	--	0.13	--	0.01
8/26/1992	--	2.4	--	--	1
2/24/1993	--	--	0.19	--	0.05
5/27/1993	--	--	0.19	--	0.05
5/27/1993	--	2.5	--	--	1
8/12/1993	--	--	0.19	--	0.04
11/4/1993	--	--	0.2	--	0.01
6/15/1994	--	--	0.21	--	0.05
9/13/1994	--	--	0.17	--	0.04
12/13/1994	--	--	0.31	--	0.01
3/16/1995	--	--	0.2	--	0.04
3/16/1995	--	1.4	--	--	1
5/16/1995	--	--	0.16	--	0.02
5/16/1995	--	1.9	--	--	1
7/26/1995	--	--	0.16	--	0.02
7/26/1995	--	1.6	--	--	1
10/19/1995	--	2.1	0.21	--	0.01
3/5/1996	--	3.2	--	--	1
3/5/1996	--	--	0.14	--	0.02

TABLE C-1

## Appendix .06/IX Constituent Concentrations From 1988 - 1996

## Southern Wood Piedmont

## Chattanooga, Tn

## ORGANICS

	C-07	C-07A	C-07B	WQ-01	Detection Limit
Fluorene, ppm					
6/19/1996	--	1.3	--	--	1
6/19/1996	--	--	0.14	--	0.02
11/14/1996	--	--	0.22	--	0.04
Fluoride, Free, ppm					
12/21/1989	0.21	0.24	0.9	--	0.2
11/4/1993	--	--	0.81	--	0.2
12/13/1994	--	--	0.79	--	0.2
5/16/1995	--	--	0.85	--	0.2
10/19/1995	--	--	0.77	--	0.2
3/5/1996	--	--	0.83	--	0.2
6/19/1996	--	--	0.84	--	0.2
11/14/1996	--	--	0.78	--	0.2
Indeno(1,2,3-cd) pyrene, ppm					
2/4/1988	--	0.04	--	--	0.01
9/13/1988	0.03	0.07	--	--	0.01
3/20/1989	--	0.87	--	--	0.2
5/4/1989	0.93	0.25	--	--	0.2
1/16/1991	--	0.3	--	--	0.01
8/14/1991	--	0.021	--	--	0.01
Lindane, ppm					
6/28/1988	--	--	--	0.49	0
9/12/1988	--	--	--	0.067	0
10/11/1988	--	--	--	0.077	0
m+p-Cresol, ppm					
3/20/1989	0.55	--	--	--	0.2
m+p-Cresol, ppm					
7/19/1989	0.53	--	--	--	0.2
12/21/1989	0.33	--	--	--	0.2
7/11/1990	0.47	--	--	--	0.2
1/16/1991	0.33	--	--	--	0.01
5/28/1991	0.77	0.26	--	--	0.1
8/14/1991	0.11	--	--	--	0.01
10/9/1991	1	0.43	--	--	0.01
m-Cresol, ppm					
10/12/1988	0.21	0.054	0.0077	--	0.02
3/20/1989	0.55	--	--	--	0.2

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont  
Chattanooga, Tn**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Detection Limit
m-Cresol, ppm					
7/19/1989	0.53	--	--	--	0.2
12/21/1989	0.33	--	--	--	0.2
Methoxychlor, ppm					
11/4/1993	--	0.00068	--	--	0.0005
11/14/1996	--	0.0017	--	--	0.0005
Methyl parathion, ppm					
11/4/1993	0.0034	--	--	--	0.0005
Naphthalene, ppm					
2/4/1988	72	7.2	1.5	--	0.01
6/29/1988	11	2.1	2.3	--	0.01
9/13/1988	12	12	1.1	--	0.01
10/12/1988	22	10	8.8	--	0.2
3/20/1989	24	74	12	--	0.2
5/4/1989	--	--	2.1	--	0.01
5/4/1989	68	13	--	--	0.2
7/19/1989	--	1.5	0.51	--	0.01
7/19/1989	2.2	--	--	--	0.2
12/21/1989	9.6	--	--	--	0.2
12/21/1989	--	4.5	0.29	--	0.01
5/8/1990	--	7	0.94	--	0.01
5/8/1990	10	--	--	--	0.2
7/11/1990	--	--	0.66	--	0.01
7/11/1990	6.5	5.8	--	--	0.2
10/17/1990	10	7.9	--	--	0.01
1/16/1991	13	26	0.62	--	0.01
5/28/1991	10	9.9	--	--	0.1
8/14/1991	7.3	10	0.64	--	0.01
10/9/1991	9.3	12	--	--	0.1
2/19/1992	13	--	2	--	1
2/19/1992	--	50	--	--	10
6/3/1992	--	--	17	--	5
6/3/1992	5.5	6.2	--	--	0.5
8/26/1992	--	--	0.093	--	0.01
8/26/1992	11	8.4	--	--	1
11/19/1992	5.9	--	0.15	--	0.01
11/19/1992	--	8	--	--	0.1
2/24/1993	--	--	0.22	--	0.05

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**Appendix .06/IX Constituent Concentrations From 1988 - 1996**  
**Southern Wood Piedmont**  
**Chattanooga, Tn**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Detection Limit
<b>Naphthalene, ppm</b>					
2/24/1993	5	4.5	--	--	0.5
5/27/1993	6.6	--	--	--	0.5
5/27/1993	--	12	--	--	1
5/27/1993	--	--	0.14	--	0.05
8/12/1993	--	--	0.07	--	0.04
8/12/1993	9.7	10	--	--	1
11/4/1993	12	16	0.081	--	0.01
6/15/1994	--	--	0.081	--	0.05
6/15/1994	9	8.3	--	--	1
9/13/1994	--	--	0.1	--	0.04
9/13/1994	5.8	--	--	--	0.5
9/13/1994	--	12	--	--	1
12/13/1994	14	14	0.28	--	0.01
3/16/1995	--	--	0.15	--	0.04
3/16/1995	11	9	--	--	1
5/16/1995	--	--	0.061	--	0.02
5/16/1995	11	12	--	--	1
7/26/1995	--	--	0.099	--	0.02
7/26/1995	9.2	13	--	--	1
10/19/1995	13	18	0.079	--	0.01
3/5/1996	--	--	0.16	--	0.02
3/5/1996	12	14	--	--	1
6/19/1996	--	--	0.048	--	0.02
6/19/1996	9.3	11	--	--	1
11/14/1996	12	12	--	--	1
11/14/1996	--	--	0.066	--	0.04
<b>o-Cresol, ppm</b>					
2/4/1988	1.3	0.06	--	--	0.01
10/12/1988	0.4	--	--	--	0.2
3/20/1989	1.8	--	--	--	0.2
5/4/1989	1.4	0.045	--	--	0.2
7/19/1989	1.2	--	--	--	0.2
12/21/1989	0.91	--	--	--	0.2
12/21/1989	--	--	0.1	--	0.01
7/11/1990	1.3	--	--	--	0.2
10/17/1990	1.3	1.2	--	--	0.01
1/16/1991	1.3	--	--	--	0.01
8/14/1991	0.63	0.16	--	--	0.01
10/9/1991	1.1	0.36	--	--	0.01
2/19/1992	1	--	--	--	1
11/19/1992	0.11	--	--	--	0.01
11/19/1992	--	0.18	--	--	0.1

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**Appendix .06/IX Constituent Concentrations From 1988 - 1996**  
**Southern Wood Piedmont**  
**Chattanooga, Tn**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Detection Limit
p-Cresol, ppm					
10/12/1988	0.21	0.054	0.0077	--	0.02
3/20/1989	0.55	--	--	--	0.2
7/19/1989	0.53	--	--	--	0.2
12/21/1989	0.33	--	--	--	0.2
Phenanthrene, ppm					
2/4/1988	62	2.7	1.2	--	0.01
6/29/1988	2.6	2.4	2.3	--	0.01
9/13/1988	6.5	5.7	1.7	--	0.01
10/12/1988	16	4.9	13	--	0.2
3/20/1989	9.1	55	21	--	0.2
5/4/1989	--	--	1.5	--	0.01
5/4/1989	50	8.5	--	--	0.2
7/19/1989	--	0.44	0.12	--	0.01
7/19/1989	1.6	--	--	--	0.2
12/21/1989	--	0.47	0.51	--	0.01
12/21/1989	0.41	--	--	--	0.2
5/8/1990	--	0.63	0.33	--	0.01
5/8/1990	0.7	--	--	--	0.2
7/11/1990	--	--	0.75	--	0.01
7/11/1990	0.85	1.4	--	--	0.2
10/17/1990	2.7	2.4	0.33	--	0.01
1/16/1991	0.56	16	0.48	--	0.01
5/28/1991	--	--	0.11	--	0.01
5/28/1991	0.4	1.5	--	--	0.1
8/14/1991	0.37	1.6	0.58	--	0.01
10/9/1991	0.42	2.9	--	--	0.1
2/19/1992	1.1	--	3	--	1
2/19/1992	--	27	--	--	10
6/3/1992	0.63	1.3	--	--	0.5
6/3/1992	--	--	39	--	5
8/26/1992	--	--	0.14	--	0.01
8/26/1992	--	4.8	--	--	1
11/19/1992	0.24	--	0.26	--	0.01
11/19/1992	--	3.4	--	--	0.1
2/24/1993	--	--	0.29	--	0.05
2/24/1993	--	1.1	--	--	0.5
5/27/1993	--	--	0.28	--	0.05
5/27/1993	--	5.9	--	--	1
8/12/1993	--	--	0.28	--	0.04
8/12/1993	--	1.4	--	--	1

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## Appendix .06/IX Constituent Concentrations From 1988 - 1996

## Southern Wood Piedmont

## Chattanooga, Tn

## ORGANICS

	C-07	C-07A	C-07B	WQ-01	Detection Limit
Phenanthrene, ppm					
11/4/1993	--	1.8	0.3	--	0.01
6/15/1994	--	--	0.43	--	0.05
6/15/1994	--	1.9	--	--	1
9/13/1994	--	--	0.28	--	0.04
9/13/1994	--	2.3	--	--	1
12/13/1994	--	1.2	0.38	--	0.01
3/16/1995	--	--	0.37	--	0.04
3/16/1995	--	3.6	--	--	1
5/16/1995	--	--	0.22	--	0.02
5/16/1995	--	4.6	--	--	1
7/26/1995	--	--	0.24	--	0.02
7/26/1995	--	4.2	--	--	1
10/19/1995	--	4.8	0.32	--	0.01
3/5/1996	--	--	0.19	--	0.02
3/5/1996	--	7	--	--	1
6/19/1996	--	--	0.18	--	0.02
6/19/1996	--	3.2	--	--	1
11/14/1996	--	--	0.39	--	0.04
11/14/1996	--	1.8	--	--	1
Phenol, ppm					
10/12/1988	0.34	--	--	--	0.2
7/19/1989	0.32	--	--	--	0.2
7/11/1990	0.2	--	--	--	0.2
1/16/1991	0.22	--	--	--	0.01
8/14/1991	0.075	0.016	--	--	0.01
10/9/1991	0.11	--	--	--	0.1
11/19/1992	0.025	--	--	--	0.01
Pyrene, ppm					
2/4/1988	15	0.83	0.32	--	0.01
6/29/1988	--	0.72	--	--	0.01
9/13/1988	1.4	1.5	1	--	0.01
3/20/1989	--	24	7.7	--	0.01
5/4/1989	15	2.5	0.45	--	0.01
7/19/1989	0.7	--	--	--	0.2
7/19/1989	--	0.08	0.04	--	0.01
12/21/1989	--	0.11	0.15	--	0.01
5/8/1990	--	0.12	0.04	--	0.01
7/11/1990	0.12	0.27	--	--	0.2
10/17/1990	--	0.67	0.07	--	0.01
1/16/1991	0.11	6.6	0.088	--	0.01
5/28/1991	--	1	--	--	0.1
5/28/1991	--	--	0.036	--	0.01
8/14/1991	0.056	0.47	0.092	--	0.01

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**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont**

	C-07	C-07A	C-07B	WQ-01	Detection Limit
Pyrene, ppm					
10/9/1991	--	0.64	--	--	0.01
6/3/1992	--	--	15	--	0.01
8/26/1992	--	--	0.064	--	0.01
8/26/1992	--	1.2	--	--	1
11/19/1992	0.058	--	0.064	--	0.01
11/19/1992	--	1.2	--	--	0.1
2/24/1993	--	--	0.083	--	0.05
5/27/1993	--	2.3	--	--	1
8/12/1993	--	--	0.09	--	0.04
11/4/1993	--	--	0.052	--	0.01
6/15/1994	--	--	0.16	--	0.05
9/13/1994	--	--	0.045	--	0.04
12/13/1994	--	--	0.11	--	0.01
3/16/1995	--	1.5	--	--	1
3/16/1995	--	--	0.16	--	0.04
5/16/1995	--	--	0.042	--	0.02
5/16/1995	--	1.4	--	--	1
7/26/1995	--	--	0.027	--	0.02
7/26/1995	--	1.3	--	--	1
10/19/1995	--	--	0.056	--	0.01
3/5/1996	--	--	0.032	--	0.02
3/5/1996	--	2.6	--	--	1
6/19/1996	--	1	--	--	1
6/19/1996	--	--	0.039	--	0.02
11/14/1996	--	--	0.11	--	0.04
5/27/1993	575	545	485	--	0
8/12/1993	470	520	500	475	0
11/4/1993	500	510	510	425	0
4/19/1994	--	--	--	395	0
6/15/1994	500	500	450	450	0
9/13/1994	470	430	360	395	0
12/13/1994	550	460	430	400	0
3/16/1995	465	370	360	330	0
5/16/1995	420	390	350	345	0
7/26/1995	455	450	380	270	0
10/19/1995	310	300	250	--	0
10/20/1995	--	--	--	250	0
3/5/1996	260	240	240	270	0
6/18/1996	--	--	--	530	0
6/19/1996	590	580	440	--	0
9/17/1996	--	--	--	490	0
11/14/1996	555	550	430	450	0

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## Appendix .06/IX Constituent Concentrations From 1988 - 1996

## Southern Wood Piedmont

## Chattanooga, Tn

## ORGANICS

	C-07	C-07A	C-07B	WQ-01	Detection Limit
Styrene, ppm					
7/19/1989	0.0012	--	--	--	0.001
1/16/1991	0.025	--	--	--	0.001
Sulfide, ppm					
12/21/1989	0.14	0.14	--	--	0.01
11/14/1996	--	1.1	--	--	1
Sulfatepp, ppm					
11/14/1996	0.00083	0.00075	--	--	0.0005
Toluene, ppm, ppm					
2/4/1988	0.32	0.08	0.006	--	0.001
6/29/1988	0.31	0.071	0.009	--	0.001
9/13/1988	0.095	0.042	0.005	--	0.001
10/12/1988	0.14	0.014	0.0067	--	0.001
3/20/1989	0.21	0.036	0.0036	--	0.001
5/4/1989	0.28	0.041	0.0028	--	0.001
7/19/1989	0.292	0.042	0.024	--	0.001
12/21/1989	0.17	0.061	0.15	--	0.001
5/8/1990	0.31	0.0092	0.0023	--	0.001
7/11/1990	0.26	0.003	0.027	--	0.001
10/17/1990	0.21	0.055	0.002	--	0.001
1/16/1991	0.36	0.036	0.0011	--	0.001
5/28/1991	0.15	0.19	--	--	0.01
8/14/1991	0.35	0.18	--	--	0.001
10/9/1991	0.4	0.14	--	--	0.001
2/19/1992	0.19	0.048	0.0011	--	0.001
6/3/1992	0.25	0.12	--	--	0.001
8/26/1992	0.18	0.09	--	--	0.001
11/19/1992	0.16	0.11	--	--	0.001
2/24/1993	0.23	0.057	--	--	0.001
5/27/1993	0.22	0.076	--	--	0.001
8/12/1993	0.13	0.12	--	--	0.001
11/4/1993	0.17	0.052	--	0.0065	0.005
6/15/1994	0.21	0.087	--	--	0.001
9/13/1994	0.22	0.11	0.0011	--	0.001
12/13/1994	0.25	0.014	--	--	0.005
3/16/1995	0.16	0.051	--	--	0.001
5/16/1995	0.18	0.098	0.0011	--	0.001
7/26/1995	0.11	0.067	--	--	0.001
10/19/1995	0.16	--	0.061	--	0.005
3/5/1996	0.1	0.025	--	--	0.001
6/19/1996	0.067	0.06	--	--	0.001
11/14/1996	0.13	0.038	--	--	0.005

**TABLE C-1**

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont  
Chattanooga, Tn**

**ORGANICS**

	C-07	C-07A	C-07B	WQ-01	Detection Limit
Trichloroethylene, ppm 11/4/1993	--	0.02	--	0.0094	0.005
Xylenes, Total, ppm 10/9/1991	0.48	0.28	--	--	0.005
11/19/1992	0.32	0.29	--	--	0.005
10/19/1995	0.44	0.008	0.3	--	0.005
11/14/1996	0.4	0.17	--	--	0.005

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**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont**

**INORGANICS**

	C-07	C-07A	C-07B	WQ-01	Limit
<b>Arsenic, Total, ppm</b>					
6/29/1988	--	0.03	--	--	0.01
9/13/1988	--	0.025	--	--	0.01
11/19/1992	0.016	--	--	--	0.01
11/4/1993	0.022	--	--	--	0.01
12/13/1994	0.02	--	--	--	0.01
10/19/1995	0.015	--	--	--	0.01
11/14/1996	0.016	--	--	--	0.01
<b>Barium, Total, ppm</b>					
6/29/1988	0.22	0.21	0.12	--	0.01
9/13/1988	0.21	0.17	0.11	--	0.01
10/12/1988	0.2	0.11	0.091	--	0.01
12/21/1989	0.15	0.24	0.084	--	0.01
10/9/1991	--	0.14	--	--	0.01
11/19/1992	0.15	0.13	--	--	0.01
11/4/1993	0.13	0.087	0.084	0.039	0.01
12/13/1994	0.14	0.11	0.089	0.043	0.01
10/19/1995	0.14	0.14	0.1	--	0.01
10/20/1995	--	--	--	0.077	0.01
11/14/1996	0.14	0.16	0.099	0.045	0.01
<b>Cadmium, Total, ppm</b>					
10/9/1991	--	0.0071	--	--	0.005
<b>Chromium, Total, ppm</b>					
6/29/1988	--	0.03	--	--	0.01
12/21/1989	--	0.051	--	--	0.01
10/20/1995	--	--	--	0.014	0.01
<b>Cobalt, Total, ppm</b>					
6/29/1988	--	0.01	--	--	0.01
12/21/1989	--	0.03	--	--	0.01
10/20/1995	--	--	--	0.021	0.01
<b>Copper, Total, ppm</b>					
6/29/1988	--	0.02	--	--	0.01
12/21/1989	--	0.062	--	--	0.01
<b>Lead, Total, ppm</b>					
6/29/1988	--	0.02	--	--	0.01
9/13/1988	--	0.008	--	--	0.005
12/21/1989	0.005	0.038	--	--	0.005
11/19/1992	0.0052	--	--	--	0.005
12/13/1994	0.019	--	--	--	0.005

TABLE C-1

**Appendix .06/IX Constituent Concentrations From 1988 - 1996  
Southern Wood Piedmont**

**INORGANICS**

	C-07	C-07A	C-07B	WQ-01	Limit
<b>Lead, Total, ppm</b>					
10/19/1995	0.021	--	--	--	0.005
10/20/1995	--	--	--	0.014	0.005
11/14/1996	0.012	--	--	--	0.005
<b>Nickel, Total, ppm</b>					
6/29/1988	--	0.03	--	--	0.01
9/13/1988	--	0.012	--	--	0.01
12/21/1989	--	0.068	--	--	0.01
<b>Tin, Total, ppm</b>					
11/19/1992	0.054	--	--	--	0.05
<b>Vanadium, Total, ppm</b>					
6/29/1988	0.01	0.04	--	--	0.01
9/13/1988	--	0.028	--	--	0.01
10/12/1988	0.019	0.032	--	--	0.01
12/21/1989	--	0.055	--	--	0.01
10/20/1995	--	--	--	0.015	0.01
<b>Zinc, Total, ppm</b>					
6/29/1988	0.02	0.07	0.12	--	0.01
9/13/1988	0.029	0.055	0.02	--	0.01
10/12/1988	1.4	--	--	--	0.01
12/21/1989	0.026	0.16	0.03	--	0.01
11/19/1992	0.043	--	--	--	0.02
11/4/1993	0.025	--	0.027	0.021	0.02
10/19/1995	--	--	0.035	--	0.02
10/20/1995	--	--	--	0.033	0.02

**TABLE C-2**  
**Site Specific Constituents**  
**Identified in Ground Water at SWP Chattanooga Site**

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**PHENOLICS:**

2, 4 – Dimethylphenol  
2 – Methylphenol  
3 – Methylphenol  
4 – Methylphenol  
Phenol

**SINGLE-RING AROMATICS:**

1, 2 – Dimethylbenzene  
1, 2 – Dimethylbenzene  
1, 4 – Dimethylbenzene  
Benzene  
Ethylbenzene  
Styrene  
Toluene

**LIGHT AROMATICS:**

2 – Methylnaphthalene  
Acenaphthene  
Acenaphthylene  
Anthracene  
Dibenzofuran  
Fluoranthene  
Fluorene  
Naphthalene  
Phenanthrene  
Carbazole

**HEAVY AROMATICS:**

Benzo (a) anthracene  
Benzo (a) pyrene  
Benzo (b) fluoranthene  
Benzo (k) fluoranthene  
Chrysene  
Dibenzo (a, h) anthracene  
Ideno (1, 2, 3 – cd) pyrene  
Pyrene

**INORGANICS:**

Sulfide  
Arsenic  
Chromium

PREPARED/DATE: MAB 5/25/01  
CHECKED/DATE: SEB 5/25/01

TABLE C-3  
PHYSICAL AND CHEMICAL PROPERTIES  
OF SITE-SPECIFIC CONSTITUENTS  
Southern Wood Piedmont  
Chattanooga, Tennessee

Constituent	CAS Number	Formula Weight (gm/mole)	Reference	Melting Point (deg C)	Reference	Boiling Point (deg C)	Reference	Vapor Density (air = 1)	Reference
1,2-Dimethylbenzene	1330-20-7	106.16	1	-25	1	144.4	2	3.7	3
1,3-Dimethylbenzene	1330-20-7	106.17	3	-47.4	1	139.3	1	3.66	3
1,4-Dimethylbenzene	1330-20-7	106.17	2	13-14	1	137-138	1	3.7	3
2,4-Dimethylphenol	105-67-9	122.16	2	26	2	211.5	2		
2-Methylnaphthalene	91-57-6	142.2	2	34	2	241/242	2		
2-Methylphenol (o-Cresol)	95-48-7	108.13	2	31	2	191	2	3.7	2
3-Methylphenol (m-Cresol)	108-39-4	108.13	2	12	2	202	2	3.72	2
4-Methylphenol (p-Cresol)	106-44-5	108.13	2	34.8	2	202	2	3.72	2
Acenaphthene	83-32-8	154.21	2	90/95	2	279	2		
Acenaphthylene	208-96-8	152.21	11	92.6	3	265/275	13		
Anthracene	120-12-7	178.23	2	216.2/216.4	2	340	2	6.15	2
Benzene	71-43-2	78.11	2	55	2	80.1	2	2.77	2
Benzo(a)anthracene	56-32-8	228	6	162	6	435(sub)	6		
Benzo(a)pyrene	50-32-8	252.3	2	179	2	311 @ 10mmHg	2		
Benzo(b)fluoranthene	205-99-2	252.32	17	167	17				
Benzo(k)fluoranthene	207-08-9	252	8						
Carbazole	86-74-8	167.21	2	245/246	2	335	2		
Chrysene	218-01-9	228.2	2	254	2	448	2		
Ethylbenzene	100-41-4	116.16	1	-94.97	6	136.2	6	3.66	19
Fluoranthene	53-70-3	202	2	107	2	250	2		
Fluorene	86-73-7	166.21	1	116/117	1	295	1		
Indeno(1,2,3-cd) pyrene	193-39-5	276.34	2	160/163	2	536	2		
Naphthalene	91-20-3	128.19	6	80.1	6	217.9	2	4.42	2
Phenanthrene	85-01-8	178.24	6	101	6	340	6		
Phenol	108-95-2	94.11	6	41	2	182	6	3.24	2
Pyrene	129-00-0	202.24	1	156	1	404	1		
Styrene	100-42-5								
Toluene	108-88-3	92.1	2	-95.1	2	110.8	2	3.14	2
Dibenzo(a,h)anthracene	53-70-3	278.35	2	266/267	2	524	2		
Dibenzofuran	132-64-9	168.21	6	86/87	6	287	6		
Arsenic	7440-38-2	74.92	3	817	3				
Chromium, Total	7440-47-3	51.99	3	1900	3	2642	3		
Sulfide*	7783-06-4	34.08	3	-85.49	3	-60.33	3	1.19	3

\* Hydrogen sulfide used as a surrogate for sulfide.

TABLE C-3

**PHYSICAL AND CHEMICAL PROPERTIES  
OF SITE-SPECIFIC CONSTITUENTS**

**Southern Wood Piedmont  
Chattanooga, Tennessee**

Constituent	Specific Gravity @deg C		Reference	Vapor Pressure @ 20 C (mm Hg)	Reference	Vapor Pressure @ deg C (mm Hg)		Reference
1,2-Dimethylbenzene	0.8801	20/4	1	5	2	9	30	2
1,3-Dimethylbenzene	0.8684	15/4	1	6	2	11	30	2
1,4-Dimethylbenzene	0.86104	20/4	1	65	2	12	30	2
2,4-Dimethylphenol	1.036	20/4	2	0.0621	5	760	211.5	6
2-Methylnaphthalene	0.994	20/4	2					
2-Methylphenol (o-Cresol)	1.041	20/4	2			0.24/5	25/64	2
3-Methylphenol (m-Cresol)	1.038	20/4	2	0.04	2	0.12/5	30/76	2
4-Methylphenol (p-Cresol)	1.0347	20/4	2	0.04	2	0.11/1	25/53	2
Acenaphthene	1.069	20/4	2	2.80E-03	4	1.55E-03	20/30	8
Acenaphthylene	1.194	25	3	1.48E-03	11			
Anthracene	1.25	20/4	2			760	342	6
Benzene	0.8786	20/4	2	76	2	60/118	15/30	2
Benzo(a)anthracene						2.20E-08	20/30	8
Benzo(a)pyrene				7.32E-07	5	5.60E-09	20/30	8
Benzo(b)fluoranthene						5.00E-07	20/30	8
Benzo(k)fluoranthene						5.10E-07	20/30	8
Carbazole	1.1	18/4	2			400	323	2
Chrysene	1.274	20/4	2	1E-11/1E-08	5	6.30E-09	20/30	8
Ethylbenzene	0.867	20/4	6	7	8			
Fluoranthene				1E-06/1E-04	5	5.00E-06	20/30	8
Fluorene	1.202	20/4	1			760	295	6
Indeno(1,2,3-cd)pyrene				1.00E-10	5			
Naphthalene	1.152	100/4	2	0.23	4			
Phenanthrene	1.025	20/4	2	2.10E-04	4			
Phenol	1.07	20/4	2	0.2	2			
Pyrene								
Styrene				5	2	9.5	30	2
Toluene	0.867	20/4	2			10/40	6.4/31.8	2
Dibenzo(a,h)anthracene				1.00E-10	5			
Dibenzofuran	1.0886	99	3					
Arsenic	5.727	14	3			1/10	372/437	3
Chromium, Total	7.14	20	3			1	1616	3
Sulfide*	1.50E-03	0	3			1.56E+04	25	3

\* Hydrogen sulfide used as a surrogate for sulfide.

**TABLE C**  
**PHYSICAL AND CHEMICAL PROPERTIES**  
**OF SITE-SPECIFIC CONSTITUENTS**  
**Southern Wood Piedmont**  
**Chattanooga, Tennessee**

Constituent	Diffusion Coefficient (cm <sup>2</sup> /sec)	Reference	Henry's Law Constant (atm*m <sup>3</sup> /mole)	Reference	Aqueous Solubility (@ deg C (mg per liter)		Reference
1,2-Dimethylbenzene			5.10E-03	4	178	25	3
1,3-Dimethylbenzene					162	25	3
1,4-Dimethylbenzene					198	25	3
2,4-Dimethylphenol					7870	25	3
2-Methylnaphthalene							
2-Methylphenol (o-Cresol)			1.10E-06	8	31000	40	2
3-Methylphenol (m-Cresol)			1.10E-06	8	23500	20	2
4-Methylphenol (p-Cresol)	5.05E-06	9	1.10E-06	8	24000	40	2
Acenaphthene			9.20E-05	11	3.9	20	4
Acenaphthylene			1.48E-03	11	3.93	25	3
Anthracene			1.02E-03	8	1.29	25	2
Benzene	0.0932	15	5.50E-03	4	1780	20	2
Benzo(a)anthracene			1.16E-06	8	0.044	24	2
Benzo(a)pyrene			1.55E-06	8	0.003	NA	2
Benzo(b)fluoranthene			1.19E-05	8	0.0012	NA	3
Benzo(k)fluoranthene			3.94E-05	8	0.0008	25	3
Carbazole					NA		
Chrysene			1.05E-06	8	0.006	25	2
Ethylbenzene	7.55E-02	15	6.43E-03	8	152	20	2
Fluoranthene			6.46E-06	8	0.265	25	2
Fluorene					1.9	25	2
Indeno(1,2,3-cd)pyrene			6.68E-08	8	0.062	20	3
Naphthalene			1.15E-03	4	31.7	20	14
Phenanthrene			1.59E-04	11	0.816	21	2
Phenol	0.085	20	4.54E-07	11	82000	15	3
Pyrene					0.16	26	2
Styrene			3.30E-03	4	300	20	2
Toluene			6.37E-03	8	515	20	2
Dibenzo(a,h)anthracene			7.33E-08	8	0.00059	25	3
Dibenzofuran					4.22	25	3
Arsenic					Insol.	NA	3
Chromium, Total					Insol.	NA	3
Sulfide*					3980	20	3

\* Hydrogen sulfide used as a surrogate for sulfide.

TABLE 3  
PHYSICAL AND CHEMICAL PROPERTIES  
OF SITE-SPECIFIC CONSTITUENTS  
Southern Wood Piedmont  
Chattanooga, Tennessee

Constituent	Octanol-Water Partition Coefficient	Reference
1,2-Dimethylbenzene	589	2
1,3-Dimethylbenzene	1585	2
1,4-Dimethylbenzene	1413	2
2,4-Dimethylphenol	316	7
2-Methylnaphthalene	13000	4
2-Methylphenol (o-Cresol)		
3-Methylphenol (m-Cresol)	91/102	2
4-Methylphenol (p-Cresol)	83/87	2
Acenaphthene		
Acenaphthylene	5012	11
Anthracene	28200	4
Benzene	130	2
Benzo(a)anthracene	407000	5
Benzo(a)pyrene	1.10E+06	5
Benzo(b)fluoranthene		
Benzo(k)fluoranthene	1.15E+06	2
Carbazole	1950	2
Chrysene	407000	2
Ethylbenzene	1410	8
Fluoranthene	79000	20
Fluorene	13000	4
Indeno(1,2,3-cd)pyrene	4.57E+07	19
Naphthalene	1000/2800	2
Phenanthrene	37000	14
Phenol	29	2
Pyrene	76000	4
Styrene		
Toluene	128	10
Dibenzo(a,h)anthracene	933000	5
Dibenzofuran		
Arsenic		
Chromium, Total		
Sulfide*		

PREPARED/DATE: BDH 5/25/01  
CHECKED/DATE: MAB 5/25/01

\* Hydrogen sulfide used as a surrogate for sulfide.

Table C-3 Physical and Chemical Properties of Site-Specific Constituents  
Southern Wood Piedmont, Chattanooga, Tennessee

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Table C-3 Physical and Chemical Properties of Site-Specific Constituents  
Southern Wood Piedmont, Chattanooga, Tennessee

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Table C-4  
List of Mammals, Reptiles and Amphibians  
Observed Near Chattanooga Creek  
Southern Wood Piedmont, Chattanooga, Tennessee

---

<u>Scientific Name</u>		<u>Common Name</u>
	<b>MAMMALS</b>	
<u>Procyon lotor</u>		Raccoon
<u>Ondatra zibethicus</u>		Muskrat
<u>Marmota monax</u>		Groundhog, woodchuck
<u>Sciurus carolinensis</u>		Eastern gray squirrel
<u>Canis familiaris</u>		Domestic Dog
<u>Castor canadensis</u>		Beaver
<u>Felis domesticus</u>		Domestic Cat
<u>Mustela vison</u>		Mink
<u>Sylvilagus aquaticus</u>		Swamp rabbit
<u>Sylvilagus floridanus</u>		Eastern Cottontail
	<b>BIRDS</b>	
---		Heron
<u>Accipiter cooperii</u>		Coopers Hawk
<u>Agelaius phoeniceus</u>		Red-winged Blackbird
<u>Aix sponsa</u>		Wood Duck
<u>Anas discors</u>		Blue-winged Teal
<u>Anas platyrhynchos</u>		Mallard
<u>Anas rubripes</u>		American Black Duck
<u>Ardea herodias</u>		Great Blue Heron
<u>Branta canadensis</u>		Canada Goose
<u>Buteo jamaicensis</u>		Red-tailed Hawk
<u>Buteo lineatus</u>		Red-shouldered Hawk

**Table C-4**  
**List of Mammals, Reptiles and Amphibians**  
**Observed Near Chattanooga Creek**  
**Southern Wood Piedmont, Chattanooga, Tennessee**

---

<u>Scientific Name</u>	<u>Common Name</u>
<u>Butorides striatus</u>	Green-backed Heron
<u>Cardinalis cardinalis</u>	Northern Cardinal
<u>Carduelis tristis</u>	American Goldfinch
<u>Cathartes aura</u>	Turkey Vulture
<u>Ceryle alcyon</u>	Belted Kingfisher
<u>Chaetura pelagica</u>	Chimney Swift
<u>Colaptes auratus</u>	Northern Flicker
<u>Corvus brachyrhynchos</u>	American Crow
<u>Cyanocitta cristata</u>	Blue Jay
<u>Dendroica coronata</u>	Yellow-rumped Warbler
<u>Falco sparverius</u>	American Kestrel
<u>Fulica americana</u>	American Coot
<u>Junco hyemalis</u>	Dark-eyed Junco
<u>Lophodytes cucullatus</u>	Hooded merganser
<u>Melanerpes carolinus</u>	Red-bellied Woodpecker
<u>Melospiza melodia</u>	Song Sparrow
<u>Mimus polyglottos</u>	Northern Mockingbird
<u>Molothrus ater</u>	Brown-headed Cowbird
<u>Parus bicolor</u>	Tufted Titmouse
<u>Parus carolinensis</u>	Carolina Chickadee
<u>Picoides pubescens</u>	Downy Woodpecker
<u>Picoides villosus</u>	Hairy Woodpecker

Table C-4  
List of Mammals, Reptiles and Amphibians  
Observed Near Chattanooga Creek  
Southern Wood Piedmont, Chattanooga, Tennessee

---

<u>Scientific Name</u>	<u>Common Name</u>
<u>Pipilio erythrophthalmus</u>	Rufous-sided Towhee
<u>Protonotaria citrea</u>	Prothonotary Warbler
<u>Quiscalus quiscula</u>	Common Grackle
<u>Sialia sialis</u>	Eastern Bluebird
<u>Spizella pusilla</u>	Field Sparrow
<u>Stelgidopteryx sarripennis</u>	Rough-winged swallow
<u>Strix varia</u>	Barred Owl
<u>Sturnus vulgaris</u>	European Starling
<u>Thryothorus ludovicianus</u>	Carolina Wren
<u>Toxostoma rufum</u>	Brown Thrasher
<u>Tringa solitaria</u>	Solitary Sandpiper
<u>Turdus migratorius</u>	American Robin
<u>Zenaida macroura</u>	Mourning Dove
<u>Zonotrichia albicollis</u>	White-throated Sparrow

#### REPTILES & AMPHIBIANS

<u>Rana catesbeiana</u>	Bullfrog
<u>Pseudemys scripta</u>	Pond cooter or slider red-ear turtle
<u>Chelydra serpentina</u>	Snapping turtle
---	Tadpole
<u>Nerodia sp.</u>	Water snake

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**Table C-4**  
**List of Mammals, Reptiles and Amphibians**  
**Observed Near Chattanooga Creek**  
**Southern Wood Piedmont, Chattanooga, Tennessee**

---

**Scientific Name**

**Common Name**

**Information Sources**

Tennessee Department of Health and Environment, Chattanooga  
Creek Survey, 1981-1982, Chattanooga, Tennessee, June 1983.

LAW, 1997. Technical Memorandum for an Ecological Evaluation of  
Chattanooga Creek, July 24, 1997.

**Table C-5**  
**Distribution of Chattanooga Creek Benthic**  
**Macroinvertebrates According to Station Number**  
**Southern Wood Piedmont, Chattanooga, Tennessee**

Station Number <sup>1</sup> (1-13) (CCM)/ Sampling Location <sup>2</sup> (LOC 1-8)	TAXA		
	Family	Genera	Total number of Individuals
1 (0.5 CCM)	21	27	212
LOC 8 (~0.5 CCM)	NA	22	1423
2 (2.5 CCM)	13	16	249
LOC 7 (~2.5 CCM)	NA	33	988
5 (2.7 CCM)	15	18	85
LOC 6 (~2.7 CCM)	NA	27	648
LOC 5 (~2.7 CCM)	NA	14	105
LOC 4 (~2.7 CCM)	NA	25	369
LOC 3 (~2.7 CCM)	NA	29	304
6 (3.8 CCM)	11	17	75
LOC 2 (~3.8 CCM)	NA	39	757
7 (4.1 CCM)	24	34	190
8 (4.4 CCM)	20	23	211
LOC 1 (~4.4 CCM)	NA	36	1112
9 (4.7 CCM)	16	24	155
10 (4.9 CCM)	24	32	151
11 (5.2 CCM)	25	31	117
12 (6.0 CCM)	30	35	151
13 (7.5 CCM)	17	22	85

NA                      Not available

Information Sources:

<sup>1</sup>Tennessee Department of Health and Environment, Chattanooga Creek Survey, 1981 - 1982, Chattanooga, Tennessee, June 1983.

<sup>2</sup>LAW, 1997. Technical Memorandum for an Ecological Evaluation of Chattanooga Creek. July 24, 1997.

CCM = Chattanooga Creek Mile or the number of miles upstream from the mouth of the Chattanooga Creek.

**Table C-6**  
**List of Fish Species Inhabiting Chattanooga Creek**  
**Southern Wood Piedmont, Chattanooga, Tennessee**

	<u>Upper Reach</u>	6.6-12.0 CCM	Trophic Guild
<b>Centrarchidae</b>			
	<u>Micropterus salmoides</u>	large mouth bass	I/P
	<u>Lepomis machrochrus</u>	blue gill	I
	<u>Pomoxis annularis</u>	white crappie	I/P
<b>Ictaluridae</b>			
	<u>Ictaluras natalis</u>	yellow bullhead	I
	<u>Lower Reach</u>	0.2 - 6.6 CCM	
<b>Ictaluridae</b>			
	<u>Ictaluras melas</u>	black bullhead	I
	<u>Ameiurus natalis</u>	yellow bullhead	I
<b>Centrarchidae</b>			
	<u>Micropterus salmoides</u>	large mouth bass	I/P
	<u>Lepomis macrochirus</u>	blue gill	I
	<u>Lepomis microlophus</u>	red-eared sunfish	I
	<u>Lepomis auritus</u>	red breasted sunfish	I/P
	<u>Lepomis cyanellus</u>	green sunfish	I/P
	<u>Pomoxis annularis</u>	white crappie	I/P
	<u>Ambloplites rupestris</u>	rock bass	P
	<u>Lepomis auritus</u>	redbreast sunfish	I
	<u>Lepomis gulosus</u>	warmouth	I
	<u>Lepomis megalotis</u>	longear sunfish	I
<b>Cyprinidae</b>			
	<u>Cyprinus carpio</u>	common carp	O
	<u>Campastoma anomalum</u>	central stoneroller	H
	<u>Cyprinella spiloptera</u>	spotfin shiner	I
<b>Castostomidae</b>			
	<u>Ictiobus cyprinellus</u>	big mouth buffalo	I/P
<b>Catostomidae</b>			
	<u>Catostamus commersoni</u>	white sucker	O
	<u>Hypentelium nigricans</u>	northern hog sucker	I
	<u>Minytrema melanops</u>	spotted sucker	I
<b>Petromyzontidae</b>			

	<u>Ichthyomyzon castaneus</u>	chestnut lamprey	P
<b>Poeciliidae</b>	<u>Gambusia affinis</u>	mosquito fish	I
<b>Sciaenidae</b>	<u>Aplodinotus grunniens</u>	freshwater drum	I

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#### Trophic Guild

Insectivores (I): adult diet consists of more than 75% insects

Piscivores (P): adult diet consists of more than 75% fish

Omnivores (O): adult diet consists of more than 25% plant material and more than 25% animal material

Herbivores (H): adult diet consists of more than 75% plant material

#### Information Sources

LAW, 1997. Technical Memorandum for an Ecological Evaluation of Chattanooga Creek. July 24, 1997.

Tennessee Department of Health and Environment, Chattanooga, Creek Survey, 1981 - 1982, Chattanooga, Tennessee, June 1983.

Milligan, J.D., and B.S. Neal, Organic Compounds and Metals in Fish from Chattanooga Creek and Nickajack Reservoir Division of Water Resources, Tennessee Valley Authority, TVA/ONRED/AWR-85/1.

Table C-7 Maximum Allowable Concentration Limits (MACLs)  
Southern Wood Piedmont, Chattanooga, Tennessee

Constituent	Human MACL Surface Water (mg/L)	Ecological MACL-acute (mg/L)	Ecological MACL-chronic (mg/L)	Human MACL Source	Ecological MACL Source
<b>PHENOLICS:</b>					
2,4-Dimethylphenol	4.63E-02	2.12E+00	1.00E-00	(3)	(5,9)
2-Methylphenol	5.53E-02	2.00E-00	7.00E-02	(3)	(9,10)
3-Methylphenol	5.53E-02	7.00E-00	7.00E-02	(3)	(9,10)
4-Methylphenol	6.08E-03	4.00E+00	7.00E-02	(3)	(9,10)
Phenol	1.71E+00	1.02E+01	2.56E+00	(3)	(5)
<b>SINGLE-RING AROMATICS:</b>					
1,2-Dimethylbenzene	1.70E+01	1.10E+01	7.63E-01	(11)	(5)
1,3-Dimethylbenzene	2.60E+00	9.20E+00	9.20E-01	(11)	(10,11)
1,4-Dimethylbenzene	2.60E+00	1.12E+00	7.63E-01	(11)	(5)
Benzene	5.00E-03	5.30E+00	5.30E-01	(1)	(5)
Ethylbenzene	7.00E-01	3.20E+01	2.50E-01	(1)	(5)
Styrene	1.00E-01	1.00E+01	2.50E-01	(1)	(4)
Toluene	1.00E+00	1.75E+04	1.75E+03	(1)	(5,15)
<b>LIGHT AROMATIC HYDROCARBONS:</b>					
2-Methylnaphthalene	1.03E+01	2.30E+00	6.20E-01	(3,6)	(17)
Acenaphthene	1.20E+00	1.70E+00	5.20E-01	(3)	(5)
Acenaphthylene	9.60E-01	2.01E+00	2.01E-01	(3,7)	(5, 9)
Anthracene	9.60E-00	2.61E+00	2.61E-01	(3)	(12,15)
Carbazole	2.58E-03	1.93E+00	1.93E-01	(3)	(12,15)
Dibenzofuran	1.66E-02	2.22E+00	2.22E-01	(3,8)	(12,15)
Fluoranthene	3.00E-01	3.98E+00	3.98E-01	(3)	(4,15)
Fluorene	1.30E+00	2.22E+00	2.22E-01	(3)	(12,15)
Naphthalene	1.03E+01	2.30E+00	6.20E-01	(3)	(5)
Phenanthrene	9.60E-01	3.00E-02	6.30E-03	(3,7)	(5)
<b>HEAVY AROMATIC HYDROCARBONS:</b>					
Benzo(a)anthracene	4.40E-06	1.00E+00	1.00E-01	(3)	(13,16)
Benzo(a)pyrene	2.00E-04	5.00E-03	5.00E-04	(1)	(14,15)
Benzo(b)fluoranthene	4.40E-06	5.00E-03	5.00E-04	(3)	(14,15)
Benzo(k)fluoranthene	4.40E-06	5.00E-03	5.00E-04	(3)	(14,15)
Chrysene	4.40E-06	5.00E-03	5.00E-04	(3)	(14,15)
Dibenzo(a,h)anthracene	4.40E-06	5.00E-03	5.00E-04	(3)	(14,15)
Indeno(1,2,3-cd)pyrene	4.40E-06	5.00E-03	5.00E-04	(3)	(14,15)
Pyrene	9.60E-01	6.00E-03	6.00E-04	(3)	(10,15)
<b>INORGANICS:</b>					
Arsenic	5.00E-02	3.60E-01	1.90E-01	(1)	(11)
Chromium	1.00E-01	1.60E-02	1.10E-02	(1)	(5)
Sulfide	2.50E+02	2.00E-02	2.00E-03	(2)	(4,5)

(1) USEPA (2000). Drinking Water Standards and Health Advisories, Office of Water, United States Environmental Protection Agency, Summer 2000.

(2) Secondary Drinking Water Standards, see (1).

(3) Taken from Ambient Water Quality Criteria for Protection of Human Health via Ingestion of Water and Organisms, if available; otherwise calculated using USEPA-reviewed toxicity values.

(4) USEPA (1999). National Recommended Water Quality Criteria - Correction, Office of Water, United States Environmental Protection Agency, EPA 822-Z-99-001, April 1999.

(5) NOAA (1999). Screening Quick Reference Tables, Coastal Protection and Restoration Division, National Oceanic and Atmospheric Administration, September 1999.

(6) Based on naphthalene.

(7) Based on pyrene.

(8) Based on withdrawn toxicity value.

(9) Kingsbury, G.L., J.B. White, J.S. Watson (1980). Multimedia Environmental Goals for Environmental Assessment, Volumes I-IV and Volume I Supplement A, EPA-600/7-77-136a,b;176a,b;EPA-600/70-80-041.

(10) Verschueren, K. (1983). Handbook of Environmental Data on Organic Chemicals; Van Nostrand Reinhold Company, New York.

(11) Tennessee Water Quality Criteria, Chapter 1200-4, Rule 3-.03(3)(g).

(12) Derived from octanol-water partition coefficient ( $K_{ow}$ )

Table C-7      Maximum Allowable Concentration Limits (MACLs)  
Southern Wood Piedmont, Chattanooga, Tennessee

- (13) Finger, S.E., E.F. Little, M.G. Henry, J.F. Fairchild and T.P. Boyle (1985). Comparison of Laboratory and Field Assessment of Fluorene - Part I: Effect of Fluorene on the Survival, Growth, Reproduction and Behavior of Aquatic Organisms in Laboratory Tests, ASTM STP 865, T.P. Boyle, ed., American Society for Testing and Materials, Philadelphia, PA.
- (14) TOXNET Database, National Library of Medicine, Bethesda, Md.
- (15) MACL-chronic was developed as 1/10 the MACL-acute.
- (16) MACL-acute was developed as 10 times the MACL-chronic.
- (17) Based on naphthalene.

PREPARED/DATE: BDH 5/25/01  
CHECKED/DATE: LMS 5/25/01

**TABLE C-8**  
**Bioconcentration Factors for Site Specific Constituents**  
**Southern Wood Piedmont**  
**Chattanooga, Tennessee**

Constituent	Bioconcentration Factors (mL/mg)	BCF Source
<b>PHENOLICS:</b>		
2,4-Dimethylphenol	4.34	1
2-Methylphenol	9.43	2
3-Methylphenol	9.43	2
4-Methylphenol	8.55	2
Phenol	3.48	2
<b>LIGHT AROMATICS:</b>		
Carbazole	125	1
Dibenzofuran	1300	3
Naphthalene	10.5	4

- 
- 1 Based on solubility equation in Verschueren, K. (1983). Handbook of Environmental Data on Organic Chemicals; Van Nostrand Reinhold Company, New York.
- 2 Based on Kow from equation in Veith, G.D., D.L. Defoe and B.V. Bergstedt (1979). Measuring and Estimating the Bioconcentration Factor of Chemicals in Fish, Journal of Fishery Research Board, Canada.
- 3 TOXNET Database, 2001.
- 4 Hassett, 1983.

PREPARED / DATE:	<u>BDH 5/25/01</u>
CHECKED / DATE:	<u>LMS 5/25/01</u>

Table C-9 Alternate Concentration Limits  
Southern Wood Piedmont, Chattanooga, Tennessee

Constituent	Chronic MACL (1) (mg/L)	Acute MACL (2) (mg/L)	Chronic ACL (mg/L) (3)		Acute ACL (mg/L) (3)		Governing ACL (mg/L) (4)	
			Segment One	Segment Two	Segment One	Segment Two	Segment One	Segment Two
<b>PHENOLICS</b>								
2,4-Dimethylphenol	4.63E-02	2.12E+00	9.88E+01	3.90E+01	2.26E+03	8.93E+02	9.88E+01	3.90E+01
2-Methylphenol	5.53E-02	2.00E+00	1.18E+02	4.66E+01	2.13E+03	8.42E+02	1.18E+02	4.66E+01
3-Methylphenol	5.53E-02	7.00E+00	1.18E+02	4.66E+01	7.47E+03	2.95E+03	1.18E+02	4.66E+01
4-Methylphenol	6.08E-03	4.00E+00	1.30E+01	5.12E+00	4.27E+03	1.68E+03	1.30E+01	5.12E+00
Phenol	1.71E+00	1.02E+01	3.65E+03	1.44E+03	1.09E+04	4.29E+03	3.65E+03	1.44E+03
<b>SINGLE-RING AROMATICS</b>								
1,2-Dimethylbenzene	7.63E-01	1.10E+01	1.63E+03	6.43E+02	1.17E+04	4.63E+03	1.63E+03	6.43E+02
1,3-Dimethylbenzene	9.20E-01	9.20E+00	1.96E+03	7.75E+02	9.81E+03	3.87E+03	1.96E+03	7.75E+02
1,4-Dimethylbenzene	7.63E-01	1.12E+00	1.63E+03	6.43E+02	1.19E+03	4.72E+02	1.19E+03	4.72E+02
Benzene	5.00E-03	5.30E+00	1.07E+01	4.21E+00	5.65E+03	2.23E+03	1.07E+01	4.21E+00
Ethylbenzene	2.50E-01	3.20E+01	5.33E+02	2.11E+02	3.41E+04	1.35E+04	5.33E+02	2.11E+02
Styrene	1.00E-01	1.00E+01	2.13E+02	8.42E+01	1.07E+04	4.21E+03	2.13E+02	8.42E+01
Toluene	1.00E+00	1.75E+04	2.13E+03	8.42E+02	1.87E+07	7.37E+06	2.13E+03	8.42E+02
<b>LIGHT AROMATICS</b>								
2-Methylnaphthalene	6.20E-01	2.30E+00	1.32E+03	5.22E+02	2.45E+03	9.68E+02	1.32E+03	5.22E+02
Acenaphthene	5.20E-01	1.70E+00	1.11E+03	4.38E+02	1.81E+03	7.16E+02	1.11E+03	4.38E+02
Acenaphthylene	2.01E-01	2.01E+00	4.29E+02	1.69E+02	2.14E+03	8.46E+02	4.29E+02	1.69E+02
Anthracene	2.61E-01	2.61E+00	5.57E+02	2.20E+02	2.78E+03	1.10E+03	5.57E+02	2.20E+02
Carbazole	2.58E-03	1.93E+00	5.50E+00	2.17E+00	2.06E+03	8.13E+02	5.50E+00	2.17E+00
Dibenzofuran	1.66E-02	2.22E+00	3.54E+01	1.40E+01	2.37E+03	9.35E+02	3.54E+01	1.40E+01
Fluoranthene	3.00E-01	3.98E+00	6.40E+02	2.53E+02	4.25E+03	1.68E+03	6.40E+02	2.53E+02
Fluorene	2.22E-01	2.22E+00	4.74E+02	1.87E+02	2.37E+03	9.35E+02	4.74E+02	1.87E+02
Naphthalene	6.20E-01	2.30E+00	1.32E+03	5.22E+02	2.45E+03	9.68E+02	1.32E+03	5.22E+02
Phenanthrene	6.30E-03	3.00E-02	1.34E+01	5.31E+00	3.20E+01	1.26E+01	1.34E+01	5.31E+00
<b>HEAVY AROMATICS</b>								
Benzo(a)anthracene	4.40E-06	1.00E+00	9.39E-03	3.71E-03	1.07E+03	4.21E+02	9.39E-03	3.71E-03
Benzo(a)pyrene	2.00E-04	5.00E-03	4.27E-01	1.68E-01	5.33E+00	2.11E+00	4.27E-01	1.68E-01
Benzo(b)fluoranthene	4.40E-06	5.00E-03	9.39E-03	3.71E-03	5.33E+00	2.11E+00	9.39E-03	3.71E-03
Benzo(k)fluoranthene	4.40E-06	5.00E-03	9.39E-03	3.71E-03	5.33E+00	2.11E+00	9.39E-03	3.71E-03
Chrysene	4.40E-06	5.00E-03	9.39E-03	3.71E-03	5.33E+00	2.11E+00	9.39E-03	3.71E-03
Dibenzo(a,h)anthracene	4.40E-06	5.00E-03	9.39E-03	3.71E-03	5.33E+00	2.11E+00	9.39E-03	3.71E-03
Indeno(1,2,3-cd)pyrene	4.40E-06	5.00E-03	9.39E-03	3.71E-03	5.33E+00	2.11E+00	9.39E-03	3.71E-03
Pyrene	6.00E-04	6.00E-03	1.28E+00	5.05E-01	6.40E+00	2.53E+00	1.28E+00	5.05E-01
<b>INORGANICS</b>								
Arsenic	5.00E-02	3.60E-01	1.07E+02	4.21E+01	3.84E+02	1.52E+02	1.07E+02	4.21E+01
Chromium	1.10E-02	1.60E-02	2.35E+01	9.26E+00	1.71E+01	6.74E+00	1.71E+01	6.74E+00
Sulfide	2.00E-03	2.00E-02	4.27E+00	1.68E+00	2.13E+01	8.42E+00	4.27E+00	1.68E+00

- (1) Chronic MACL was selected as the lower of the human surface water MACL and the ecological MACL-chronic (Table 5-1)
- (2) Ecological MACL-acute (Table 5-1)
- (3) Alternate Concentration Limit (ACL) calculated using the following equation

$$ACL = MACL/R$$

where R = dilution factor =  $V_{gw}/V_{sw}$

for ACL - chronic

MACL = chronic MACL (mg/L)  
 $V_{gw}$  = 0.0015 cfs for Segment One  
 = 0.0038 cfs for Segment Two  
 $V_{sw}$  = 3-day 20-yr low flow = 3.2 cfs

for ACL - acute

MACL = acute MACL (mg/L)  
 $V_{gw}$  = 0.0015 cfs for Segment One  
 = 0.0038 cfs for Segment Two  
 $V_{sw}$  = flow in mixing zone =  $0.5 \times 3.2 = 1.6$  cfs

- (4) Governing ACL was set equal to the lower of the chronic and acute ACL.

PREPARED/DATE BDH 5/25/01  
 CHECKED/DATE LMS 5/25/01

Table C-10 Selection of Ground-Water Protection Standards  
Southern Wood Piedmont, Chattanooga, Tennessee

Constituent	Governing ACL Segment One (mg/L) (1)	Governing ACL Segment Two (mg/L) (2)	Solubility Reference (mg/L)	Detection Limit (mg/L)	Proposed GWPS Segment One (mg/L)	Proposed GWPS Segment Two (mg/L)
<b>PHENOLICS</b>						
2,4-Dimethylphenol	9.88E+01	3.90E+01	7.87E+03	1.00E-02	9.88E+01	3.90E+01
2-Methylphenol	1.18E+02	4.66E+01	3.10E+04	1.00E-02	1.18E+02	4.60E+01
3-Methylphenol	1.18E+02	4.66E+01	2.35E+04	1.00E-02	1.18E+02	4.60E+01
4-Methylphenol	1.30E+01	5.12E+00	2.40E+04	1.00E-02	1.30E+01	5.12E+00
Phenol	3.65E+03	1.44E+03	8.20E+04	1.00E-02	3.65E+03	1.44E+03
<b>SINGLE-RING AROMATICS</b>						
1,2-Dimethylbenzene	1.63E+03	6.43E+02	1.78E+02	1.00E-03	1.78E+02	1.78E+02
1,3-Dimethylbenzene	1.96E+03	7.75E+02	1.62E+02	1.00E-03	1.62E+02	1.62E+02
1,4-Dimethylbenzene	1.19E+03	4.72E+02	1.98E+02	1.00E-03	1.98E+02	1.98E+02
Benzene	1.07E+01	4.21E+00	1.78E+03	1.00E-03	1.07E+01	4.21E+00
Ethylbenzene	5.33E+02	2.11E+02	1.52E+02	1.00E-03	1.52E+02	1.52E+02
Styrene	2.13E+02	8.42E+01	3.00E+02	1.00E-03	2.13E+02	8.42E+01
Toluene	2.13E+03	8.42E+02	5.15E+02	1.00E-03	5.15E+02	5.15E+02
<b>LIGHT AROMATICS</b>						
2-Methylnaphthalene	1.32E+03	5.22E+02	NA	1.00E-02	1.32E+03	5.22E+02
Acenaphthene	1.11E+03	4.38E+02	3.90E+00	1.00E-02	3.90E+00	3.90E+00
Acenaphthylene	4.29E+02	1.69E+02	3.93E+00	1.00E-02	3.93E+00	3.93E+00
Anthracene	5.57E+02	2.20E+02	1.29E+00	1.00E-02	1.29E+00	1.29E+00
Carbazole	5.50E+00	2.17E+00	NA	1.00E-02	5.50E+00	2.17E+00
Dibenzofuran	3.54E+01	1.40E+01	4.22E+00	1.00E-02	4.22E+00	4.22E+00
Fluoranthene	6.40E+02	2.53E+02	2.65E-01	1.00E-02	2.65E-01	2.65E-01
Fluorene	4.74E+02	1.87E+02	1.90E+00	1.00E-02	1.90E+00	1.90E+00
Naphthalene	1.32E+03	5.22E+02	3.17E+01	1.00E-02	3.17E+01	3.17E+01
Phenanthrene	1.34E+01	5.31E+00	8.16E-01	1.00E-02	8.16E-01	8.16E-01
<b>HEAVY AROMATICS</b>						
Benzo(a)anthracene	9.39E-03	3.71E-03	4.40E-02	1.00E-02	1.00E-02	1.00E-02
Benzo(a)pyrene	4.27E-01	1.68E-01	1.00E-03	1.00E-02	4.27E-01	1.68E-01
Benzo(b)fluoranthene	9.39E-03	3.71E-03	1.20E-03	1.00E-02	1.00E-02	1.00E-02
Benzo(k)fluoranthene	9.39E-03	3.71E-03	8.00E-04	1.00E-02	1.00E-02	1.00E-02
Chrysene	9.39E-03	3.71E-03	6.00E-03	1.00E-02	1.00E-02	1.00E-02
Dibenzo(a,h)anthracene	9.39E-03	3.71E-03	5.90E-04	1.00E-02	1.00E-02	1.00E-02
Indeno(1,2,3-cd)pyrene	9.39E-03	3.71E-03	6.20E-02	1.00E-02	1.00E-02	1.00E-02
Pyrene	1.28E+00	5.05E-01	1.60E-01	1.00E-02	1.60E-01	1.60E-01
<b>INORGANICS</b>						
Arsenic	1.07E+02	4.21E+01	NA	1.00E-02	1.07E+02	4.21E+01
Chromium, Total	1.71E+01	6.74E+00	NA	1.00E-02	1.71E+01	6.74E+00
Sulfide	4.27E+00	1.68E+00	3.98E+03	1.00E+00	4.27E+00	1.68E+00

NA No data available  
ND Not detected in well where free product was not present  
(1) ACL calculated using the following equation

$$ACL = MACL/Rc$$

where ACL = Alternate Concentration Limit (mg/L)

MACL = Governing Maximum Allowable Concentration Limit (mg/L)

Rc = Reduction factor due to dilution with Chattanooga Creek =  $V_{gw}/V_{sw}$

$V_{gw}$  = Volume of ground water discharging into creek

$V_{sw}$  = Volume of surface water = 3.2 cfs

for Segment One,  $V_{gw}$  = 0.0015 cfs

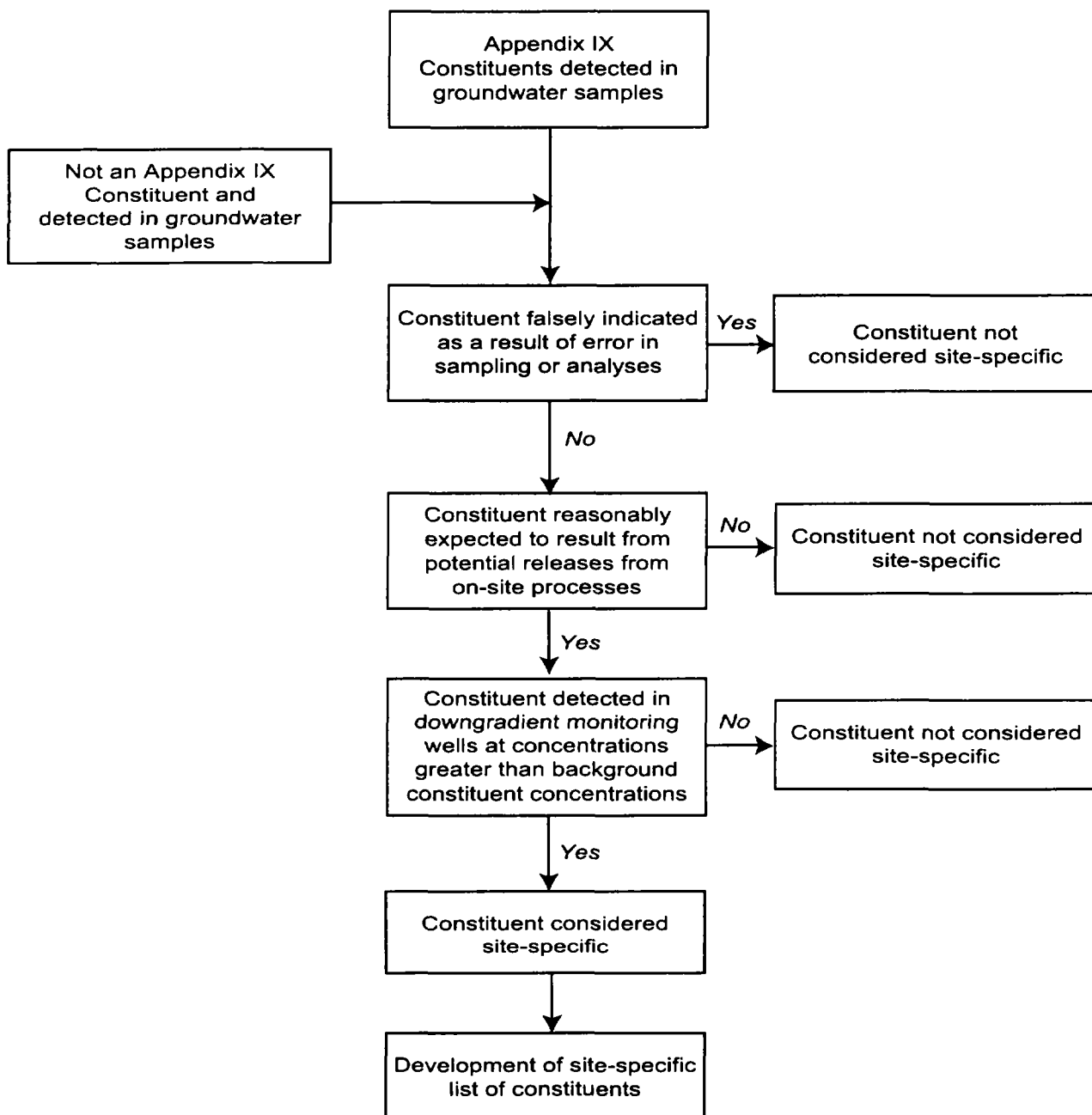
for Segment Two,  $V_{gw}$  = 0.0038 cfs

(2) The Governing ACL was selected as the GWPS unless

GWPS < detection limits, then the GWPS = detection limit

GWPS > solubility, then the GWPS = solubility

PREPARED/DATE MAB 5/25/01  
CHECKED/DATE SEG 5/25/01



SOUTHERN WOOD PIEDMONT COMPANY  
CHATTANOOGA, TENNESSEE

### DETERMINATION OF SITE-SPECIFIC CONSTITUENTS FOR GROUNDWATER MONITORING

PREPARED/DATE:

FIGURE  
NUMBER:

FILE DATE: 18 MAY 01

CHECKED/DATE:

PLOT DATE: 18 MAY 01

PROJECT NO.: 30300-1-1000

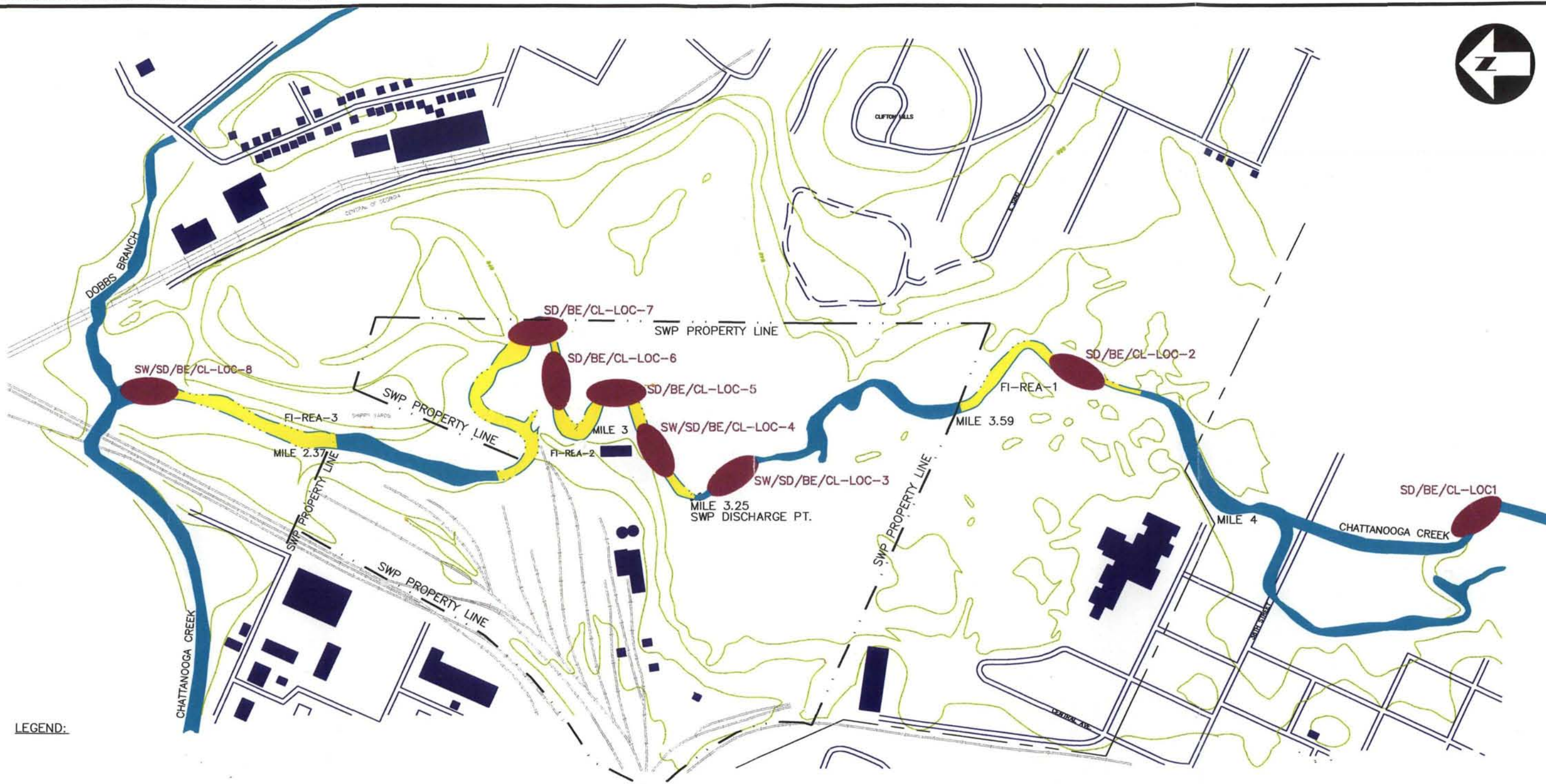
C-1

FILE NAME: 02168-11000





LAYER/LEVEL



LEGEND:

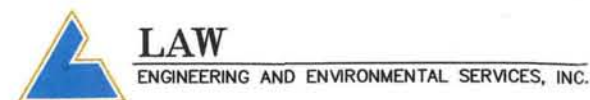
- SAMPLE LOCATION
- FISH COLLECTION REACHES
- SW - SURFACE WATER SAMPLE
- SD - SEDIMENT SAMPLE
- BE - BENTHIC MACROINVERTEBRATE SAMPLE
- CL - CLAM TISSUE SAMPLE
- FI - FISH POPULATION/ TISSUE SAMPLE

NOTE:  
PEDESTRIAN SURVEY FOR FLORA AND FAUNA INCLUDED SWP PROPERTY AND THE CHATTAHOOGA CREEK FLOODPLAIN FROM THE CREEK MEANDER JUST UPSTREAM OF THE 38TH STREET BRIDGE TO THE CONFLUENCE WITH DOBBS BRANCH.

SCALE IN FEET



SOUTHERN WOOD PIEDMONT COMPANY  
CHATTANOOGA, TENNESSEE

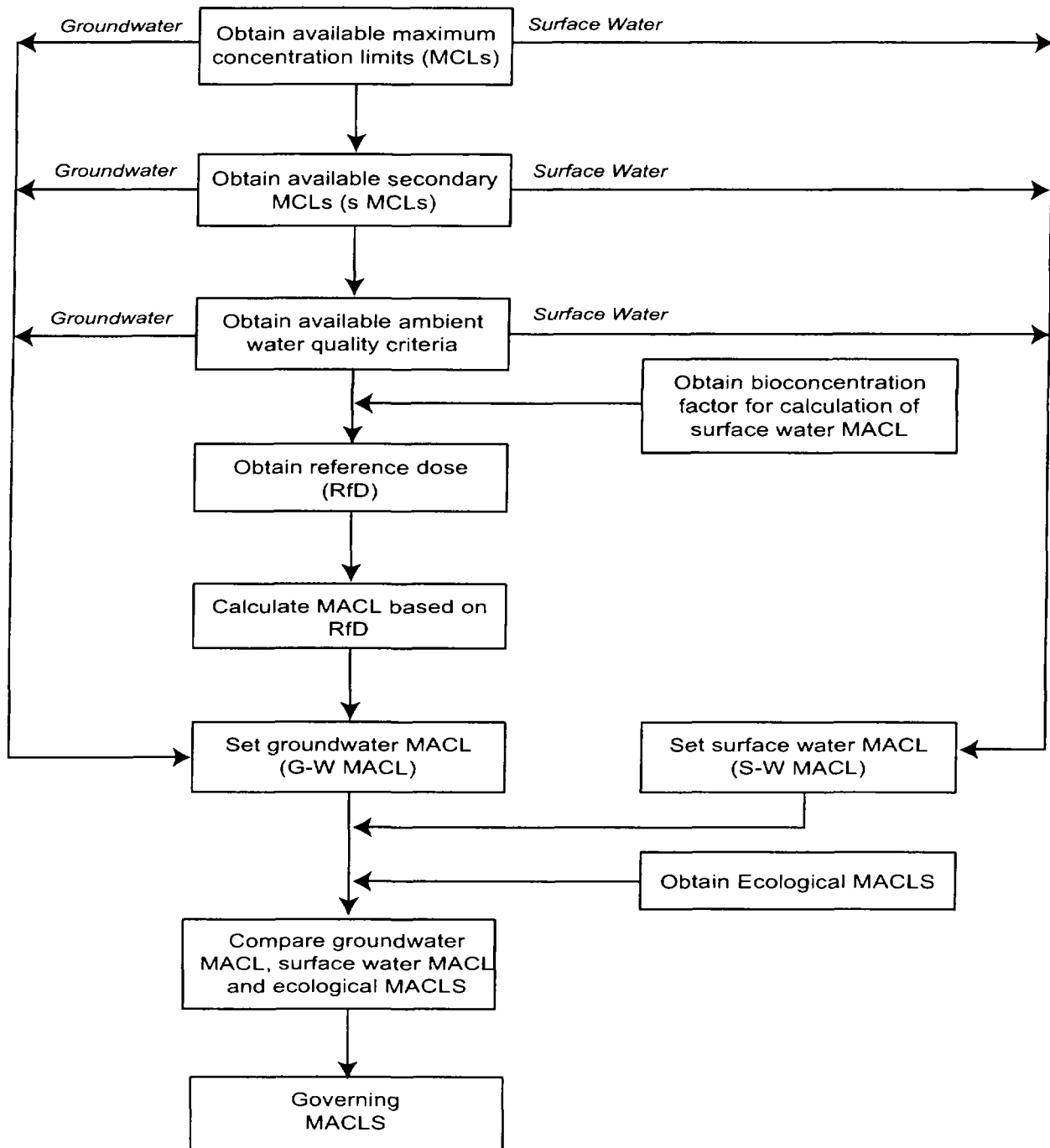


SAMPLING LOCATIONS  
FOR THE ECOLOGICAL STUDY  
SWP-CHATTANOOGA CREEK

JOB NO. 30300-1-1000

FIGURE C-3

PREPARED BY/DATE DMM 1-13-97  
CHECKED BY/DATE RSK 1-13-97



SOUTHERN WOOD PIEDMONT COMPANY  
CHATTANOOGA, TENNESSEE

## DEVELOPMENT OF THE GOVERNING MACL

PREPARED/DATE: *BSH 3/3/01*  
CHECKED/DATE: *CMS 3/3/01*  
PROJECT NO.: 30300-1-1000

FIGURE  
NUMBER  
**C-4**

FILE DATE: 29 MAR 01  
PLOT DATE: 29 MAR 01  
FILE NAME: 02167-11000

**Appendix D**

**Ground-Water Sampling and Analysis Procedures**

**APPENDIX D**

**GROUND-WATER**  
**SAMPLING AND ANALYSIS PROCEDURES**

**SOUTHERN WOOD PIEDMONT COMPANY**  
**CHATTANOOGA, TENNESSEE**

**REVISED MAY, 2001**

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## **1.0 INTRODUCTION**

The purpose for this protocol is to provide for the collection of representative ground-water samples and of data to document the effectiveness of the corrective action program. Any changes in these Sampling and Analysis Procedures must be submitted to the Tennessee Department of Environment and Conservation for approval prior to incorporation.

Representative samples have the physical and chemical characteristics of the ground-water within the zone (aquifer) from which the sample is obtained. This plan will guide environmental field personnel with techniques that preserve the integrity of the sample during the collection, storage, and transportation processes.

This plan and the procedures outlined should be read carefully and completely before sampling is begun. Reference to individual sections should not be made without having read the entire Sampling and Analysis Procedures.

Emphasis has been placed on procedures that reduce the potential of contaminating the sample and that prevent degradation of the sample during preservation and/or packaging for shipment prior to chemical analysis.

Sampling and Analysis of the ground-water requires implementation of the following sequence of decisions, procedures, or events:

- 1) Well and parameter selection
- 2) Water level evaluation
- 3) Well purging
- 4) Procedure for obtaining a representative sample
- 5) Preparation of sample for shipment to analytical laboratory
- 6) Proper documentation of field events including Water Level Data Sheets and Chain of Custody Forms.

Procedures for implementing each of the above are detailed herein.

## **2.0 GENERAL SAMPLING REQUIREMENTS**

Sampling will be performed by an outside contractor or SWP personnel trained in collecting and processing environmental samples for transport to a qualified analytical laboratory. Field personnel are required to maintain a field log and document all field events as follows:

- 1) Date and time
- 2) Person(s) present during sampling and persons performing the sampling
- 3) Calculations
- 4) Visual observations (e.g., inspection of well casing, concrete collar (if present) for cracks and/or deterioration, sampling appearance)
- 5) Field measurements (e.g., pH, temperature, specific conductance)
- 6) Type of equipment used (e.g., YSI Conductivity Meter)
- 7) Weather conditions (e.g., windy, overcast)
- 8) Well sampling sequence
- 9) Order of sample collection (e.g., volatiles, metals)
- 10) Problems or variance from procedures listed in this plan.

NOTE: Record all field notes with an indelible (permanent waterproof) pen.

At the end of the sampling event, all field notes are to be dated, signed, and copied. A copy should accompany the sample bottles when shipped to the analytical laboratory. When the analytical results are received from the laboratory, Southern Wood Piedmont (SWP) headquarters personnel will retain copies of results including the field sheets, Water Level Data Sheets, Chain of Custody Forms, and laboratory report sheets.

Sampling will be accomplished according to the following:

- 1) If immiscible fluids are present it must be noted in the field notes. Immiscible fluids include only heavier-than-water oil; no lighter-than-water oil has been encountered at the site and is not expected to be present at the site. Wells containing free product will not be sampled.
- 2) Sample collection should occur such that areas of minimal contamination are sampled before the more heavily contaminated areas (if such conditions are known).
- 3) Each sample should be obtained using the appropriate sampling equipment. A dedicated bailer is to be available for each well. A clean, new white nylon or polypropylene rope will be used at each well. This rope will be discarded after each sampling.
- 4) Equipment must be cleaned prior to arrival at the site by the procedure below. Once at the site, procedures b – d should be followed.
  - a. Scrub with tap water and non-phosphate laboratory grade detergent.
  - b. Rinse equipment thoroughly with tap water followed by distilled or deionized water.
  - c. Rinse with appropriate solvent (Isopropyl alcohol).
  - d. Rinse three times with distilled or deionized water.
  - e. Wrap and store equipment to prevent contamination before use at the site.

If any constituents of concern, are detected in any well, Respondent may, within thirty (30) days of obtaining the sampling results, resample those well(s) with detectable contaminants to determine whether the contamination was a result of laboratory error.

### **3.0 WELL AND PARAMETER SELECTION**

The ground-water monitoring wells to be sampled are listed in Section 7.3.1 of the Part B permit application. The ground-water from these wells is representative of ground-water leaving the waste management area and traveling toward Chattanooga Creek.

SWP will collect ground-water samples semi-annually and will analyze them for the site specific constituents listed in Table 7.1 of the Part B permit application

Each time samples are collected from monitoring wells, ground-water elevations will be determined at all accessible site monitoring wells for the purpose of determining the groundwater flow rate and direction. This demonstration will also demonstrate the effectiveness of the ground water corrective action system in providing hydraulic control, when activated.

#### 4.0 SAMPLING EQUIPMENT

Detailed below is list of supplies and equipment needed to obtain a representative ground-water sample.

- 1) **Bailers:** Each well routinely sampled has a dedicated PVC bailer. A diagram of a bailer is illustrated in Figure 1. Bailers are generally stored within the wells supported above the ground-water. Bailers are not stored in the wells if visual contamination is present or if the headspace in the well is not sufficient to prevent the bailer from touching the ground-water. When the bailers cannot be stored in the well, they are to be appropriately labeled, wrapped, and stored elsewhere on the site. If a bailer is found submerged in water due to high water levels it must be stored elsewhere on site. If it is submerged in water due to detachment of support, reattach bailer and leave in well suspended above water.
- 2) **Sample containers:** The container type (e.g., glass or plastic), the preservatives (if any), and the number of each type of container to be filled at each well will be on a form included by the laboratory with the sample containers. The types of containers and preservatives to be used are included in Table 1. The containers will be prepared by the laboratory as specified in the EPA Document "Test Methods for Evaluating Solid Waste," SW-846, Third Edition. Equipment blank and trip blank containers will be included with each sampling event. The equipment blank will be analyzed for the same parameters as the ground-water samples. The trip blank will contain reagent water from the analytical laboratory and will not be opened during the sampling process. The trip blank will be analyzed for the same volatile constituents as the ground-water samples, if

applicable. A total of 1 field and 1 trip blank per 20 samples will be taken. The size and number of sample containers will be determined by the laboratory. The Sample containers will be shipped to the plantsite by the laboratory in sample shippers prior to each sampling event. The laboratory will also include with the sample containers a Chain of Custody Form to be used when returning filled containers to the laboratory for analysis.

- 3) **Distilled or deionized water:** Distilled or deionized water is required for cleaning the sampling equipment before, during and after each sampling event.
- 4) **Gloves:** Disposable plastic or rubber gloves are to be worn when sampling. The gloves will be discarded after each use. SWP personnel will assure proper disposal at an approved disposal facility of used gloves at the end of the sampling event.
- 5) **Cleaning solvent:** Isopropyl alcohol.
- 6) **Rope:** A new polypropylene or nylon rope will be attached to each dedicated bailer. This rope must be discarded after use at each well. At the end of the sampling event, all rope will be disposed of by SWP personnel properly at an approved disposal facility.
- 7) **pH Meter:** A Corning Model 3 pH Meter or equivalent will be used to measure the pH of the ground-water. Buffer solutions within the expected pH range will be used to calibrate the pH meter prior to use.
- 8) **Conductivity Meter:** A YSI Model 31 Conductivity Meter or equivalent will be used to determine the specific conductance of the ground-water. Standard solutions of potassium chloride will be used to calibrate the conductivity meter.
- 9) **Thermometer:** A thermometer will be used to measure the temperature of the ground-water at the time of sampling.

- 10) **Water Depth Indicator:** A Soiltest, Inc., Model DR-760A water level meter or equivalent method, such as an electronic meter or weighted tape, will be used to determine the water level of the wells prior to sampling. The depth indicator will be cleaned between sampling locations as per Section 2.0, 4a – 4d.
- 11) **Plastic Sheets:** Plastic sheets will be placed on the ground around or adjacent to each well during sampling to prevent surface soils from coming in contact with the sampling equipment. Each sheet will be discarded after the sample has been taken, and a different sheet used at the next well. The used plastic sheets will be disposed of properly by SWP at an approved disposal facility.
- 12) **Measuring Tape:** A calibrated measuring tape may be used to determine water levels and total depths in the wells.
- 13) **Five Gallon Pail:** To contain the ground-water during purging.
- 14) **Beaker:** To be used when measuring pH, specific conductance, and temperature.
- 15) **Sealing Tape:** Used to seal the sample shipper and/or sample containers prior to shipping.

## **5.0 WELL PURGING**

### **5.1 Examination of the Well**

- 1) The order in which wells are to be purged and sampled is from background wells to downgradient wells.
- 2) Identify the well and record the well number in the field log book, using a permanent, waterproof pen.
- 3) Verify that the well is not damaged. Immediately notify the site environmental manager if well damage is suspected.
- 4) Don new disposable gloves. A different pair of gloves will be used for each well.
- 5) Place a clean plastic sheet on the ground around the well to prevent surface soils from coming into contact with the purging and sampling equipment.
- 6) Unlock the well and carefully remove the well cover to avoid causing foreign material to enter the well. Place the cover on the plastic sheet.
- 7) If needed, the exterior and interior of the exposed riser pipe should be wiped with clean filter paper (or equivalent) and deionized or distilled water.
- 8) Remove the dedicated bailer from the well and place it on the plastic sheet. If any part of the bailer is submerged in water, measure the water level before removing the bailer. If this is impossible, remove the bailer, pour water from it back into well and then proceed with water level measurements. If this bailer is in the water, note this in field log book. After purging and sampling, if the bailer was submerged in water due to high water level, label bailer and store elsewhere on site. If bailer was submerged in water due to detachment of support, reattach bailer and leave in well suspended above water.

## **5.2 Ground-Water Elevation Determination Prior to Purging**

- 1) Each well is marked with an easily identifiable permanent reference point (surveyed to an accuracy of 0.01 feet) that will be used when obtaining ground-water level measurements.
- 2) Prior to purging and sampling, the ground-water level and total depth of the well are measured using an electronic water level indicator, line with weight attached, or calibrated measuring tape. The water level indicator cord is to be marked at five foot intervals. The steel tape is to be marked at 0.01 foot intervals.
- 3) Turn on the water level meter if meter is used.
- 4) Verify that the instrument is working properly by pressing the check button.
- 5) Rinse the weight of the precleaned water level meter with solvent followed by deionized water (See Section II).
- 6) Begin to lower the weight and cord attachment into well while watching/listening closely for the first meter reading.
- 7) When the circuit is complete the needle will deflect or a buzzer will be activated.
- 8) Mark the point of the cord at the top of the PVC pipe (at the surveyed measuring point), where the buzzer first beeps or the needle first moves.
- 9) Remove the cord from the well and measure from that mark to the nearest calibrated mark on the cord (measured to the nearest 0.01 feet).
- 10) Record this number in field log book to calculate the elevation. Note: Groundwater elevations are obtained by subtracting the measured water level from the surveyed top of riser elevation.
- 11) Remove the cord from the well.

- 12) Rinse the portion of the cord and probe which entered the well with solvent (IPA) and deionized water. If visual oil is observed use a nonphosphate soap wash with tap water followed by solvent (IPA) and triple deionized water rinse.
- 13) Place water level meter in its storage container and proceed with measurement of the total well depth if the well is being sampled.

### **5.3 Measuring Well Depths**

1. Using a sounder, water level indicator or weighted tape, measure the depth of the well by lowering probe to the bottom of the well.
2. Record depth obtained in field log book.
3. If immiscible fluids (DNAPL – Dense Nonaqueous Phase Liquids) are present ex., floaters, sinkers, record observation in the field log book. Using string, tape, or monofilament with weight attached to end, measure the thickness of the oil present.
4. If a measuring tape is used, clean the tape and attached weight. See Section II.4. String or monofilament must be properly disposed of by SWP personnel.

NOTE: At a minimum, total depths will be measured annually.

### **5.4 Purging the Well**

- 1) If a separate immiscible phase liquid is visually detected in the purge water during the purging process, this will be noted in field log book.
- 2) All purge water from wells containing visible free oil must be disposed in the POTW pre treatment system.
- 3) For wells which do not purge to dryness, a minimum of three well casing volumes of standing water should be removed from the well prior to sampling. This volume can be calculated by using the following formula:

$$V(\text{gal}) = h \times \text{conversion factor} \times 3 \text{ (volumes)}$$

$$V(\text{gal}) \times 3.79 = V \text{ (liters)}$$

where:

V = volume of water to be purged measured in gallons

h = linear feet of standing water in the casing [h=total well depth-depth to water]

Conversion factor: See Table below.

#### **SAMPLE VOLUME FACTOR (CONVERSION FACTOR)**

Internal Diameter of well casing (inches)	Fluid [V=5.22(ID) <sup>2</sup> ]	Gallons [V=0.0408(ID) <sup>2</sup> ]	Milliliters [V=154.4(ID) <sup>2</sup> ]
1/2	1.31	0.01	38.6
3/4	2.95	0.02	86.9
1	5.22	0.04	154.4
1 1/4	8.16	0.06	241.3
1 1/2	11.74	0.09	347.3
2	20.80	0.16	617.6
2 1/2	32.60	0.26	965.0
3	47.00	0.37	1390.0
4	83.50	0.65	2470.0

- 4) Generally, dedicated PVC bailers are to be used throughout the facility. These bailers are to be stored within the well to which each is dedicated. They are to be securely suspended above the level of ground-water within the well.
- 5) Clean the bailer prior to use. Rinse with distilled water, laboratory grade Isopropyl Alcohol, and finally, rinse three times with distilled water.
- 6) Catch the rinse water (obtained from the final rinse of the bailer) and place it in the bottles labeled "equipment blank." One equipment blank per 20 samples will be collected per sampling event. The equipment blank will be analyzed for the same parameters as the other samples. Trip blanks will also be provided and analyzed for the volatile parameters on the constituent list.

- 7) During purging of the well, the intake opening of the purge device should be positioned just below the surface of the water. If the water level drops during purging, the intake should be lowered as needed to maintain flow.
- 8) Remove the calculated amount of water from the well by bailing and collecting it in a container of known volume (5 gallon pail). Determination of pH, specific conductance, and temperature is necessary during the bailing process. Record all measurements in the field log book.
- 9) If a well purges to dryness, but recharges rapidly, the purging rate should be reduced so as to maintain a relatively constant water level in the well during the purge (i.e., match the purging rate to the recharge rate of the well).
- 10) If a well purges to dryness and is slow to recharge, only one well volume of water needs to be purged.
- 11) In purging the well, the bailer is lowered to a depth sufficient to fill it. It is then retrieved and emptied, repetitively. Dedicated bailers are to be used to purge shallow wells and wells with limited volumes of water to be removed.
- 12) All well purging devices must be thoroughly cleaned prior to each use at a well and prior to sampling ground-water to be analyzed. Thorough cleaning is to include nonphosphate detergent washing, tap water rinse, Isopropyl Alcohol Rinse, and deionized or distilled water rinse.
- 13) Once the calculated amount of water has been purged, pour away from the well head, and if visible oil is noted, dispose on-site in the POTW treatment system.
- 14) All purging equipment must be stored and handled in a manner which minimizes the possibility of accidentally contaminating it.

## 5.5 Documentation

The sampling team should record the following information regarding the well purging procedure in the field log book:

Day/Date/Time

Weather Conditions

Air Temperature

Condition of the well (rusty, bent casing, etc.)

Person(s) doing the purging

Type of purging equipment used

Ground-water level prior to purging

Depth to the bottom of the well

Volume of ground-water to be purged

Physical properties of purged water:

color

odor

turbidity

presence of non-aqueous liquids

All pH, specific conductance, and temperature measurements.

Volume of purge water.

Procedures for collection, measurement, and disposal of purge water.

Decontamination and cleaning procedures for equipment used at more than one

well.

Person(s) present during the purging process.

## 6.0 SAMPLING

### 6.1 Sampling Devices

- 1) Samples shall be collected with the dedicated PVC bailers from the wells. These bailers are not to be re-used during a sampling event without first being thoroughly cleaned.
- 2) Each well in the monitoring network is to be sampled with the same type of sampling device as it had been sampled previously. In other words, if Well X is sampled with a bailer, it shall continue to be sampled with a bailer.
- 3) A new clean polypropylene, polyethylene, or nylon rope is to be used at each sampling event. Used ropes are to be properly discarded.

### 6.2 Sample Collection

- 1) The clean bailer is to be lowered gently into the upper portion of the water column. The bailer is to be removed gently from the water so that only minimal surging of the well occurs.
- 2) Sample collection shall follow the sequence set forth below:

<u>Sequence</u>	<u>Parameter</u>
1	Volatile Organic Compounds (VOA)
2	Acid Extractable Organics
3	Base/Neutral Organics
4	Total Metals
5	Sulfide
6	pH
7	Specific Conductance

- 3) Sample jars for VOA should be filled with no airspace. Do not overfill the bottles because some may contain preservatives. A funnel is not to be used.
- 4) If the recharge rate of the well is insufficient to obtain a complete suite of samples within 24 hours after purging the well, as many of the required samples as possible will be obtained with the water which is available in the well.
- 5) The physical appearance of the ground-water observed during sampling is to be recorded. Observations of the samples are to be made when filling the sample containers. These observations (e.g., turbid, visible oil) are to be recorded in the field log book.
- 6) Immediately place sample bottles on ice.
- 7) Remove rope from bailer and have SWP personnel properly discard rope as well as plastic sheet, gloves, etc.
- 8) Repeat same procedure until all wells have been sampled.

### **6.3 Sample Preservation and Shipment**

- 1) Immediately following collection of the samples, place them in a cooler with “freezer-pacs” or bags of ice in order to maintain sample integrity. To meet maximum recommended holding times, the samples are to be shipped by overnight courier to the laboratory.
- 2) The shipping container used will be designed to prevent breakage, spills, and contamination of the samples. Tight packing material is to be provided around each sample container and any void around the “freezer-pacs.” The container is to be securely sealed, clearly labeled, and accompanied by a Chain of Custody Record. Paperwork is to be placed in a plastic bag within the shipper with the sample bottles.

- 3) Ship the samples to the analytical laboratory by a means which assures arrival at the laboratory the following day. Record the method of shipment and shipment number (e.g., airbill number, if known) in the field log book.

## 7.0 CHAIN OF CUSTODY

A Chain of Custody Form is an accurate written record which will trace possession and handling of the sample from the moment of collection through laboratory analysis and final recording of results. An example of a Chain of Custody Form is shown in Figure 3. A Chain of Custody Form should accompany the sample bottles at all times.

The most practical way to minimize chain of custody problems is to involve the least number of people and use standardized documentation. The activities associated with establishing and maintaining a chain of custody can be summarized as follows:

- Each sample should be uniquely identified on the container(s). An example sample label is shown on Figure 4.
- Samples should be properly packaged and dispatched as soon as possible to the appropriate laboratory for analysis. Sample containers should be packed in a proper sample shipper (i.e., cooler) along with the Chain of Custody Form, copies of pertinent field records, and copies of analytical request forms (if used). Field personnel should place a seal as specified in the EPA Document "Test Methods for Evaluating Solid Waste," SW-846 Third Edition, on the sample shipper to indicate tampering.
- When transferring possession of the samples, the transferee should sign and record the date and time of the Chain of Custody Form. Each person who takes custody should be noted in the appropriate section of the Chain of Custody Form.
- Once the samples have arrived at the analytical laboratory, laboratory personnel should reconcile the information on the sample label and seal against that on the Chain of Custody Form. Discrepancies between the information on the sample and seal and that on the chain of Custody Form and the sample analysis request sheet should be resolved

before the sample is assigned for analysis. Samples should then be placed in a secured sample storage room or locked cabinet until analyzed.

When filling out chain of Custody Forms, include the following information:

sample identification

sample log number

date and time of sample collection

number of bottles per sample

method of shipment

sample matrix (i.e., ground-water)

parameters requested for analysis

signatures of person(s) involved in the chain of possession

Figure 3 shows an example of a Chain of Custody Form.

## **8.0 ANALYTICAL METHODOLOGY**

All laboratory procedures used to analyze ground-water samples will be acceptable to the Tennessee DEC. Where possible, these procedures will be those described in the US EPA document "Test Methods for Evaluating Solid Waste," SW-846, third edition. The procedures to be used for the parameters discussed in this plan are given in Table 5.

Table 1  
SITE SPECIFIC PARAMETERS,  
SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

	<u>Sample Container</u>	<u>Preservative</u>	<u>Holding Time</u>
2,4-dimethylphenol	Glass	Cool to 4° C	*7 days/40
2,4-dinitrophenol	Glass	Cool to 4° C	*7 days/40
2-chlorophenol	Glass	Cool to 4° C	*7 days/40
2-methylnaphthalene	Glass	Cool to 4° C	*7 days/40
Acenaphthene	Glass	Cool to 4° C	*7 days/40
Acenaphthylene	Glass	Cool to 4° C	*7 days/40
Anthracene	Glass	Cool to 4° C	*7 days/40
Arsenic	Polyethylene	HNO <sub>3</sub> to pH < 2	6 months
Benzo (a) anthracene	Glass	Cool to 4° C	*7 days/40
Benzo (a) pyrene	Glass	Cool to 4° C	*7 days/40
Benzo (b) Fluoranthene	Glass	Cool to 4° C	*7 days/40
Benzo (k) Fluoranthene	Glass	Cool to 4° C	*7 days/40
Chromium	Polyethylene	HNO <sub>3</sub> to pH < 2	6 months
Chrysene	Glass	Cool to 4° C	*7 days/40
dibenzo (a,h) anthracene	Glass	Cool to 4° C	*7 days/40
Dibenzofuran	Glass	Cool to 4° C	*7 days/40
Ethylbenzene	Glass	HCL to pH < 2	14 days
Styrene	Glass	HCL to pH < 2	14 days
Fluoranthene	Glass	Cool to 4° C	*7 days/40
Fluorene	Glass	Cool to 4° C	*7 days/40
indeno (1,2,3-cd) pyrene	Glass	Cool to 4° C	*7 days/40
3-Methylphenol	Glass	Cool to 4° C	*7 days/40
4-Methylphenol	Glass	Cool to 4° C	*7 days/40
Naphthalene	Glass	Cool to 4° C	*7 days/40
2-Methylphenol	Glass	Cool to 4° C	*7 days/40
Pyrene	Glass	Cool to 4° C	*7 days/40
** pH			
Phenanthrene	Glass	Cool to 4° C	*7 days/40
Phenol	Glass	Cool to 4° C	*7 days/40
**Specific Conductance			
Sulfide	Glass	Zn (C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub>	*7 days/40
Toluene	Glass	HCL to pH < 2	14 days
1,2-Dimethylbenzene	Glass	HCL to pH < 2	14 days
1,3-Dimethylbenzene	Glass	HCL to pH < 2	14 days
1,4-Dimethylbenzene	Glass	HCL to pH < 2	14 days
Benzene	Glass	Cool to 4° C	*7 days/40
Carbazole	Glass	Cool to 4° C	*7 days/40

\* 7 days before extraction - 40 days after extraction

\*\* Field Measurements

**TABLE 2**

Site Specific Parameters to be Analyzed

Volatile Organics

1,2-Dimethylbenzene  
1,3-Dimethylbenzene  
1,4-Dimethylbenzene  
2-Methylphenol  
2-Methylnaphthalene  
2,4-Dimethylphenol  
3-Methylphenol  
4-Methylphenol  
Acenaphthene  
Acenaphthylene  
Anthracene  
Benzene  
Benzo(a)anthracene  
Benzo(a)pyrene  
Benzo(b)fluoranthene  
Benzo(k)fluoranthene

Inorganics

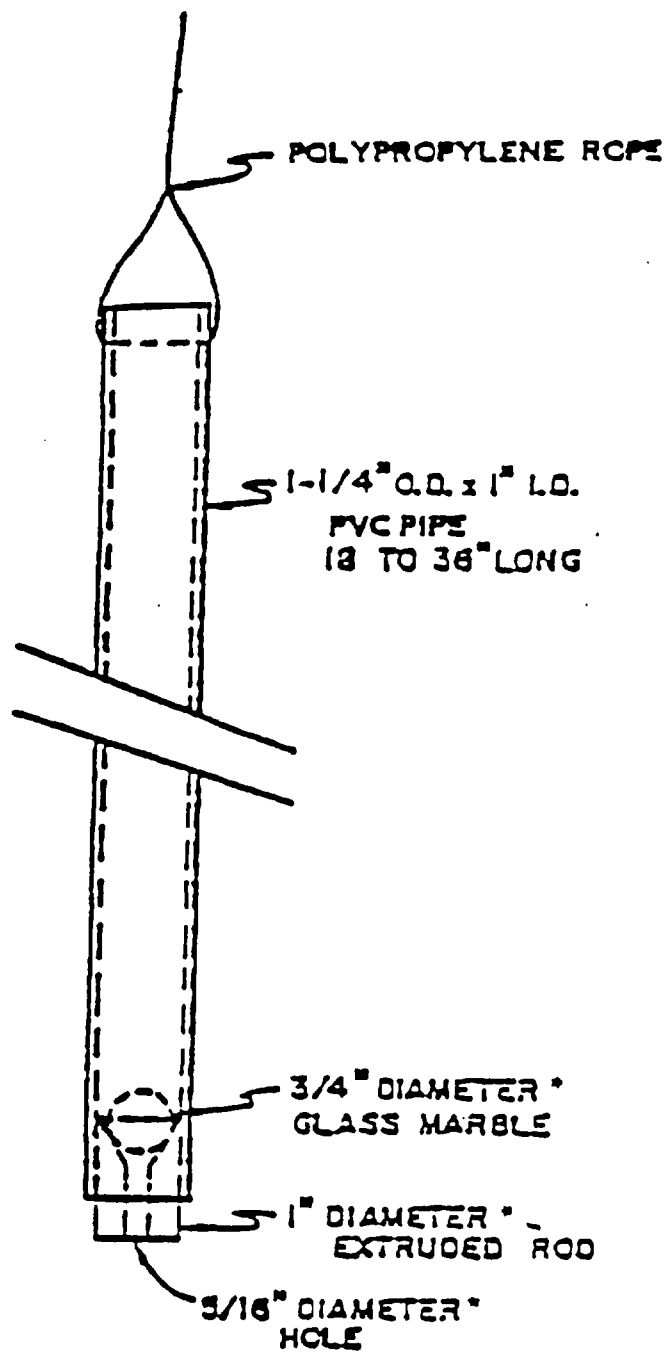
Arsenic  
Chromim  
Sulfide

Extractable/Base Neutral Organics

Carbazole  
Chrysene  
Dibenzofuran  
Dibenzo(a,h)anthracene  
Ethylbenzene  
Fluoranthene  
Fluorene  
Indeno(1,2,3-cd)pyrene  
Naphthalene  
Phenanthrene  
Phenol  
Pyrene  
Styrene  
Toluene

**TABLE 3**

Method of Analysis	
Extractable Organics	SW-846 Method 8270B
Base Neutral Organics	SW-846 Method 8270B
Volatile Organics	SW-846 Method 8021
Chromium	Method 6010
Arsenic	Method 6010
Sulfide	Method 376.2



NOTE: A PVC FOOT VALVE IS  
ALSO ACCEPTABLE

SOUTHERN WOOD  
PIEDMONT CO.



LAW ENGINEERING TESTING  
COMPANY

MARIETTA, GEORGIA

SCHEMATIC OF BAILER  
FOR WELL SAMPLING

FIGURE I

FIGURE II



# WATER LEVEL DATA SHEET

**Client/Facility:**

Collector:

[illegible]



☐ 5102 LaRoche Avenue, Savannah, GA 31404  
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301  
☐ 414 Southwest 12th Avenue, Deerfield Beach, FL 33442  
☐ 900 Lakeside Drive, Mobile, AL 36693  
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634

Phone: (912) 354-7855  
Phone: (904) 878-3994  
Phone: (305) 421-7400  
Phone: (205) 666-6633  
Phone: (813) 885-7427

Fax (912) 352-0165  
Fax (904) 878-9504  
Fax (305) 421-2584  
Fax (205) 666-6696  
Fax (813) 885-7049

## ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

[illegible]

<b>SL SAVANNAH LABORATORIES</b> & ENVIRONMENTAL SERVICES, INC.			
Savannah, GA (912) 354-7858	Deerfield Beach, FL (305) 421-7400	Mobile, AL (805) 688-8633	Tallahassee, FL (904) 878-3894
Client _____			
Sample ID _____			
Location _____			
Analysis _____			
Preservative _____			
Date _____ By _____			

SOUTHERN WOOD PIEDMONT  
CHATTANOOGA, TENNESSEE



LAW ENVIRONMENTAL, INC.

EXAMPLE OF  
SAMPLE LABEL

JOB NO. 55-5272

FIGURE 4

**Appendix E**  
**Inspection Record Forms**



**This test must be conducted at least once per year for each Highwater/Off Float switch. The test must determine if the switch is operating as designed. If the switch is not operating as designed, it must be retested.**



Inspector Name \_\_\_\_\_

Date of Inventory \_\_\_\_\_

Time of Inventory \_\_\_\_\_

**QUARTERLY EMERGENCY RESPONSE  
EQUIPMENT LIST  
INVENTORY**

<u>Inventoried Quantity</u>	<u>Required Quantity</u>	<u>Item</u>
_____	3	Square Front Shovels
_____	2	Industrial Brooms
_____	3	Rakes
_____	3	Large Hoes
_____	5	Pair Nitrile Gloves
_____	5	Pair Leather Gloves
_____	2	Rain Suits - Jacket with Hood
_____	6	Pair Vinyl Overboots
_____	10	Tyvek Suits
_____	5	Pair Safety Goggles
_____	2	Respirators - Half Mask w/PNA cert.
_____	1	Roll Heavy Plastic (20 x 100 - 6 mil polyethylene)
_____	1	Roll Duct Tape
_____	2	Rolls Absorbent Material
_____	1	Centrifugal Pump
_____	1	Fire Extinguisher 10 lb.
_____	2	Open Head Drums
_____	2	Rolls Warning Tape

Description of Maintenance, Replacement or Addition to Inventory

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The inventory must assure that each piece of equipment is available and in operating condition.



SITE: \_\_\_\_\_

[illegible]

Forms1-1 Fire Ext. 1/98

February, 1995

### RESPIRATOR INSPECTION RECORD

Inspector \_\_\_\_\_

This checklist shall be filled out at least monthly for each site respirator or self contained breathing apparatus. It may be used as a guide for other respirator inspections.

Respirator or SCBA No.							
Date & time of Inspection							
Face Piece							
Elastic Bands							
Cartridge Holder							
Inhalation Valve							
Exhalation Valve Assembly							
Cartridge							
Harness Assembly							
Gaskets							
Comments							

The following additional items shall also be inspected on a self contained breathing apparatus.

SCBA Number		
Date & Time of Inspection		
Connection Tightness		
Valves		
Connection Tube		
Regulator Warning Device		
Cylinder full of Grade D Breathing Air		
Belt		
Shoulder Straps		
Gauges		
Regulator		
Comments		

Enter a check beside each approved item inspected. Enter an X beside each defective item inspected. Date of repair of defective items shall be noted in comment section.

All respirators shall be inspected routinely before and after each use.  
A respirator that is not routinely used, but is kept ready for emergency use, shall be inspected at least monthly to assure that it is in satisfactory working condition.

YEAR: \_\_\_\_\_

# EMERGENCY LIGHT TEST LOG

SITE: \_\_\_\_\_

30 SECOND TEST AND INSPECTION												
LIGHT #	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER

30 MINUTE TEST		
LIGHT #	TEST #1 DATE	TEST #2 DATE

NOTE ANY REPAIRS OR COMMENTS:

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## o 30 Second Test and Inspection Instructions

- o All emergency lighting should be tested and inspected at least every 30 days.
  - Press the test switch for at least 30 seconds to check for lamp operation.
  - Inspect light for cleanliness, connections and other operating features of the light.

## o 30 Minute Test

- o An operation test should be performed every 6 months.
  - Disconnect emergency light from normal AC power supply.
  - Allow light to operate for 30 minutes.
  - Reconnect to AC Power Supply.

- o Each block on this Form should contain the date of the inspection/test and the inspector's initials.



## WASTE GENERATION/TEMPORARY STORAGE RECORD

LOCATION \_\_\_\_\_

Log # \_\_\_\_\_

1. Accumulation Start Date \_\_\_\_\_

2. Description of Waste (Waste Type)	Min %	Max %

3. Are there free liquids in the container(s)? \_\_\_\_\_

4. Method of Waste Generation (Source)  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. Container Type/Size \_\_\_\_\_

6. Number of Containers \_\_\_\_\_

7. Empty space remaining in container(3/4, 1/2, 1/4, None) \_\_\_\_\_

8. If additional waste is added to the container, describe the date of addition, waste type, and waste source (Modify items 2, 3, and 7 if necessary)  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Weekly Container Inspection Record														
Name														
Date														
Time														
Leaks														
Cover														
Label														

Date/Description of any corrective action to container(s).  
\_\_\_\_\_  
\_\_\_\_\_

Date of Shipment \_\_\_\_\_

This form should be updated each day a hazardous waste is generated and placed in the container. Send the form to SWP's Manager of Environmental Compliance on the accumulation start date, at the end of each month, and when the container is shipped.

Sample Grabbed ☐ Log Number ☐ Analysis Results Returned ☐

# SOUTHERN WOOD PIEDMONT COMPANY

## QUARTERLY WELL INSPECTION LOG

**Well Specifications:** for newly installed wells and repairs on old wells

2 concrete collar: 4" below ground

2" above ground

**Weep hole above grout**

**Grout: 5" from top of PVC**

**Brass lock**

ID tag on top of protective casing

**Stenciled label on protective casing**

**Well-fitting cap**

**Visible survey mark/notch**

DATE: \_\_\_\_\_

PLANT: \_\_\_\_\_

INSPECTORS SIGNATURE: \_\_\_\_\_

DATE SUBMITTED TO SWP: \_\_\_\_\_

[illegible]

**POST-CLOSURE RCRA REGULATED UNIT SITE INSPECTION**  
**Southern Wood Piedmont Company**

Inspection Item	Date Inspected and Time			
<b>Reason for Inspection</b> Routine/Rainfall Date				
<b>Cover Erosion (yes/no)</b>				
<b>Settling or Sinking of Cover (yes/no)</b>				
<b>Drying out or Cracking of Cover (yes/no)</b>				
<b>Ample Groundcover (yes/no)</b>				
<b>Woody Plant Infiltration (yes/no)</b>				
<b>Drainage OK (yes/no)</b>				
<b>Security Devices Intact (yes/no)</b>				
<b>Comments</b>				
<b>Name and Signature of Inspector</b>				

Note: The above items will be inspected at least quarterly or after a major storm event.